United States Court of Appeals
for the
District of Columbia Circuit

TRANSCRIPT OF RECORD

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United States Court of Appeals for the District of Columbia

APRIL TERM, 1938.

333

No. 7225

CHARLES J. KOEBEL AND KOEBEL DIAMOND
TOOL CO., APPELLANTS,

vs.

CONWAY P. COE, COMMISSIONER OF PATENTS.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR
THE DISTRICT OF COLUMBIA.

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8—3659

United States Court of Appeals for the District of Columbia

a In the District Court of the United States for the District of Columbia

No. 61481 in Equity

Charles J. Koebel, and Koebel Diamond Tool Co.,
Plaintiffs,

vs.

Conway P. Coe, Commissioner of Patents, *Defendant.*

United States of America,
District of Columbia. ss:

BE IT REMEMBERED, That in the District Court of the United States for the District of Columbia, at the City of Washington, in said District, at the times hereinafter mentioned, the following papers were filed and proceedings had, in the above-entitled cause, to wit:—

1 In the Supreme Court of the District of Columbia

In Equity No. 61481

Charles J. Koebel, 1200 Oakman Boulevard, Detroit, Michigan and Koebel Diamond Tool Co. 1200 Oakman Boulevard, Detroit, Michigan *Plaintiffs*,

vs.

Conway P. Coe, Commissioner of Patents, *Defendant.*

Bill of Complaint to Obtain Issuance of Letters Patent Under Section 4915 of the United States Revised Statutes

Filed May 20 1936

To the Honorable, the Judges of the Supreme Court of the District of Columbia:

The plaintiffs state as follows:

1. That plaintiff, Charles J. Koebel, is a citizen of the United States of America and a resident of Detroit in the

county of Wayne and state of Michigan: that plaintiff, Koebel Diamond Tool Co., is a corporation created and existing under the laws of the state of Michigan and having a place of business at 1200 Oakman Boulevard in the city of Detroit, county of Wayne and state of Michigan; and that plaintiffs bring this suit in their own right:

2 2. That the defendant, Conway P. Coe, is the Commissioner of Patents of the United States having his official residence in the District of Columbia and is sued as the Commissioner of Patents of the United States:

3. That this bill of complaint is brought under the patent laws of the United States and specifically under Revised Statute 4915 (35 U. S. C. A. §63):

4. That the plaintiff, Charles J. Koebel, being the original, first, and sole inventor, filed an application for letters patent in the United States Patent Office on January 12, 1932 for Settings for Diamonds, which application was given the serial number 586,238, profert of certified copies of the application as filed, of the Patent Office actions therein dated February 18, 1932, September 1, 1932, March 7, 1933, September 12, 1933, March 13, 1934 and September 18, 1934, and of the applicant's amendments and communications in response thereto dated August 2, 1932, February 28, 1933, September 6, 1933, March 7, 1934, September 12, 1934 and March 15, 1935 being here made:

5. That the plaintiff, Charles J. Koebel, assigned the entire right, title and interest in and to said application and the invention thereof to Koebel-Wagner Diamond Corporation, its successors and/or assigns, a corporation created under the laws of the state of Delaware, by an instrument in writing dated January 9, 1932, said assignment being recorded in the United States Patent Office under date of January 12, 1932 in Liber I-151, page 220 Transfers of Patents, profert of a certified copy of said assignment being hereby made:

3 6. That said Koebel-Wagner Diamond Corporation assigned the entire right, title and interest in and to said application and the invention thereof and authorized the Commissioner of Patents to issue any letters patent that might issue thereon to Koebel Diamond Tool Co., one of the plaintiffs herein, by an instrument in writing dated July 12, 1932, said assignment being recorded

in the United States Patent Office under date of July 16, 1932 in Liber L-153, page 416 Transfers of Patents, profert of a certified copy of said assignment being hereby made; and that the plaintiff, Koebel Diamond Tool Co., is now the sole owner of said invention and application:

7. That said application was filed in accordance with the laws of the United States and the rules of the United States Patent Office:

8. That said application has been duly prosecuted in accordance with the laws of the United States and the rules of the United States Patent Office.

9. That said application has been passed upon by the Primary Examiner who finally refused to allow any of the three claims in the case and finally rejected these three claims (numbers 3, 4 and 7) in accordance with the rules of the Patent Office:

10. That the plaintiff, Charles J. Koebel, appealed from the decision of the Primary Examiner to the Board of Appeals who in a decision dated November 23, 1935 reversed the rejection of the Primary Examiner as to claims 3 and 4 and affirmed the Primary Examiner's rejection of claim 7 which is as follows:

> 4 7. As a new article of manufacture, a setting for diamonds consisting of a base metal alloy the principal ingredients of which are molybdenum, copper and cobalt so proportioned as to be capable of being sintered at a temperature below that of the critical point at which the desirable qualities of the diamond are adversely affected, said alloy when so sintered having the property of wetting the diamonds coupled with a lack of avidity for the carbon thereof and, when thereafter cooled, of closely adhering to it.

Profert of a certified copy of the Examiner's statement on appeal dated March 25, 1935 and of the decision of November 23, 1935 of the Board of Appeals of the United States Patent Office is here made:

11. That no appeal from the decision of the Board of Appeals was taken to the Court of Customs and Patent Appeals:

12. That the specification of said application sets out two formulas for the diamond setting "by way of example but

not of limitation" and that the percentages of those formulas are "approximate":

13. That the references relied on by the Commissioner of Patents are the following patents:

	No. 1,346,190	Fahrenwald	July 13, 1920
	No. 1,773,793	Sattler	Aug. 26, 1930
British	No. 331,414	Tigerschiold	July 3, 1930

14. That the plaintiffs contend that none of these references disclose a sintered setting for diamonds, the principal ingredients of which are molybdenum, copper and cobalt and having the characteristics recited in said claim 7; and that said claim (7) distinguishes fully over these references:

5 15. That the Commissioner of Patents by the Board of Appeals of the United States Patent Office contends that the rejected claim (7) fails to clearly define the invention because it does not specify in a definite way the proportions of molybdenum, copper and cobalt and anyone attempting to practice the invention defined by this claim (7) in its broadest aspect could not do so except by experimenting on different proportions to ascertain those that would achieve the desired result; that the claim is broader than the invention and that the disclosure does not warrant a claim for all ranges of proportions that will give the desired result:

16. That plaintiffs disagree with these contentions and contend that said claim (7) is not indefinite; that it clearly defines the invention which resides not in an alloy but in a setting for diamonds capable of being sintered at a clearly defined temperature and when so sintered having certain clearly defined characteristics and consisting of a base metal alloy containing certain principal ingredients, i. e. molybdenum, copper and cobalt; that the disclosure is sufficient to enable anyone skilled in the art to vary the proportions of molybdenum, copper and cobalt to achieve the desired result and to practice the invention defined by said claim (7) in its broadest aspect; that said claim (7) is not broader than the invention disclosed because the invention resides in a diamond setting having certain characteristics and certain specified ingredients and two formulas for

using those ingredients to produce those characteristics are disclosed and this disclosure is adequate to entitle plaintiffs to a claim for a diamond setting having the novel
characteristics recited in said claim (7) without in-
6 cluding any specified proportions of the ingredients:
and that plaintiffs are entitled to a claim covering both of the formulas disclosed without specifying therein any proportions:

17. That the Commissioner of Patents by the Board of Appeals of the United States Patent Office wrongfully and unlawfully in violation of plaintiff's rights refused plaintiffs a patent on the invention defined by said claim (7) and that plaintiffs are lawfully entitled thereto:

18. That the invention is new and useful; was not known or used by others in this country before the invention thereof of the plaintiff Charles J. Koebel; was not patented or described in any printed publication in this or any foreign country before the invention thereof of the plaintiff Charles J. Koebel or more than two years prior to the application for patent therefor by the plaintiff Charles J. Koebel; was not in public use or on sale in this country for more than two years prior to said application and was not patented in any foreign country by the plaintiffs or either of them or by their legal representatives on an application filed more than twelve months prior to said application for United States patent and that said invention has not been abandoned:

Wherefore plaintiffs pray:

(1) That a subpoena *ad respondum* directed to the Honorable Conway P. Coe, Commissioner of Patents of the United States, be issued out of and under the seal of this Honorable Court requiring him to appear and answer
unto this bill of complaint, answer under oath being
7 expressly waived:

(2) That defendant be required to abide by such order and decree as may be hereafter entered:

(3) That this Honorable Court enter a decree adjudging that plaintiffs are entitled to letters patent on the invention specified in the aforesaid claim 7 of said application and in such other claims as to this Court seem proper: and

(4) For such other and further relief as to this Honorable Court may seem meet and just.

CHARLES J. KOEBEL
KOEBEL DIAMOND TOOL CO.,
By Charles J. Koebel
President

AXEL V. BEEKEN
Attorney for Plaintiffs.

State of Michigan,
County of Wayne, ss:

On this 13th day of May, 1936, before me personally appeared Charles J. Koebel, who being by me duly sworn as to the truth of the allegations made in the above bill of complaint, says that he is one of the plaintiffs named in the foregoing bill of complaint; that he has read the foregoing bill of complaint and knows the contents thereof; and that
the same is true of his own knowledge except as to
8 the matters therein stated on information and be-
lief and as to those matters he believes them to be
true.

ARTHUR J. MURPHY
(Seal) *Notary Public*

My commission expires 8-14-38

Arthur J. Murphy
Notary Public
Wayne County, Michigan

State of Michigan,
County of Wayne, ss:

On this 13th day of May, 1936, before me personally appeared Charles J. Koebel, who being by me duly sworn as to the truth of the allegations made in the above bill of complaint, says that he is president of the Koebel Diamond Tool Co., one of the plaintiffs above named; that he has read the foregoing bill of complaint and knows the contents thereof; and that the same is true of his own knowledge except as to the matters therein stated on information and belief and as to those matters he believes them to be true.

ARTHUR J. MURPHY
(Seal) *Notary Public*

My commission expires 8-14-38

Arthur J. Murphy
Notary Public
Wayne County, Michigan

9 *Answer to the Bill of Complaint.*

Filed May 29 1936

To the Honorable
The Judges of the Supreme Court
of the District of Columbia.

Conway P. Coe, Commissioner of Patents, defendant herein, in answer to the Bill of Complaint alleges on information and belief as follows:

1. He admits the allegations of the citizenship and residence of the plaintiff Charles J. Koebel, and the allegations of incorporation and principal place of business of the plaintiff Koebel Diamond Tool Co.

2. He admits the allegations of his official position and official residence.

3. He admits the allegation of jurisdiction under Section 4915 R. S. (35 U. S. C. A. 63).

4. He admits that Charles J. Koebel, claiming to be the original, first and sole inventor of an improvement on "Base Metal Alloys", filed an application for patent on January 12, 1932, which application was given Serial No. 586,238, and admits that plaintiffs should file at the trial a certified copy of the said application and certain
10 specified papers relating thereto.

5. He admits the allegation of assignment by the plaintiff Charles J. Koebel to the Koebel-Wagner Diamond Corporation.

6. He admits the allegation of assignment by the Koebel-Wagner Diamond Corporation to the plaintiff Koebel Diamond Tool Co.

7. He admits that the application was filed in accordance with the laws and rules of the Patent Office.

8. He admits that the application was duly prosecuted.

9. He admits that the primary examiner finally rejected 3 claims then in the application, being numbers 3, 4 and 7.

10. He admits that the plaintiff Charles J. Koebel took an appeal from the action of the Examiner to the Board of Appeals and that that tribunal reversed the action of the Examiner as to claims 3 and 4 but affirmed the rejection as to claim 7.

11. He admits that no appeal has been taken to the United States Court of Customs and Patent Appeals.

12. He admits the allegations of paragraph 12 as to the specification of the application.

13. He admits that the references cited are those specified in paragraph 13.

14. He admits plaintiffs' contention as to the pertinence of the patents cited.

15. He admits that the Board of Appeals rejected claim 7 for the reasons stated in paragraph 15.

16. He admits that plaintiffs disagree with the
11 rejection of claim 7 and contend that it is allowable,
but denies that plaintiffs are entitled to a patent on the application of Charles J. Koebel containing claim 7 since that claim is deemed to be unpatentable in view of the following prior art and for the reasons given in the statement of the Examiner in answer to the appeal and the decision of the Board of Appeals, copies of which will be furnished at the trial:

Fahrenwald,	1,346,190,	July 13, 1920,
Sattler,	1,773,793,	Aug. 26, 1930,
British patent,	331,414,	July 3, 1930.

Profert of copies of these patents is hereby made.

17. He admits that he has refused and still refuses to issue to plaintiffs a patent containing claim 7, but denies that that refusal is wrongful and unlawfully in violation of plaintiffs' rights and denies that plaintiffs are entitled to a patent containing said claim 7.

18. He admits that the plaintiff Charles J. Koebel made in his application for patent averments corresponding to the allegations of paragraph 18 but denies that plaintiffs are entitled to a patent on the application of said Charles J. Koebel containing claim 7.

Further answering defendant avers that plaintiffs are not entitled to have any claim considered in this case except claim 7 (see Lucke et al. v. Coe, 63 App. D. C. 61, 1934 C. D. 44, 69 F. (2d), 379).

Wherefore defendant having fully answered the Bill of Complaint denies that plaintiffs are entitled to the relief demanded or any part thereof and prays that the Bill be dismissed with all costs of the proceedings against the plaintiffs as provided in Section 4915 R. S.

12 CONWAY P. COE
Commissioner of Patents,
Defendant.

R. F. WHITEHEAD
Solicitor of the U. S. Patent Office,
Attorney for Defendant.

District of Columbia: *ss.*

I, Conway P. Coe, Commissioner of Patents, depose and say that I have read the above answer by me subscribed and know the contents thereof, and that the statements of facts therein made as upon personal knowledge are true, and those made upon information and belief I believe to be true.

CONWAY P. COE
Commissioner of Patents.

Subscribed and sworn to before me this 28th day of May, 1936.

ALICE M KENNEDY
(Seal) *Notary Public, D. C.*

My commission expires Oct. 15, 1940

13 *Stipulation*

Filed May 23 1938

It Is Hereby Stipulated by and between the attorneys for the parties hereto that Charles J. Koebel, the inventor of the application for letters patent here under consideration, would, if called as a witness in this cause, testify under oath as set out in the attachment affidavit of said Charles J. Koebel.

AXEL V. BEEKEN
Attorney for Charles J. Koebel and Koebel Diamond Tool Co.

New York, N. Y.,
May 18, 1938

R. F. WHITEHEAD
Solicitor of United States Patent Office,

For Conway P. Coe,
Commissioner of Patents.

Washington, D. C.,
May 19, 1938.

14 *Affidavit*

Filed May 23 1938

State of New York,
County of New York, ss.

Charles J. Koebel, being duly sworn, deposes and says: That he is forty-nine years of age, is the inventor of the invention here in controversy, is one of the plaintiffs herein, and is president of Koebel Diamond Tool Co., the other plaintiff herein.

That for upwards of twenty-five years he has been engaged in the sale of diamonds for industrial purposes, in the manufacture of tools and dies in which diamonds are employed as cutting, abrading and drawing elements.

15 That he is thoroughly familiar with the art relating to the use of diamonds for industrial purposes, with the tools employing same, and with the methods of manufacture of such tools and with the settings for diamonds used in connection therewith.

The art of using diamonds for industrial purposes is a very old one,—it has been established that the pyramid builders of Ancient Egypt employed drilling tools and saws, the working surfaces of which were set with jewels.

Today, industrial diamonds are principally used in dressing tools for grinding wheels, as core bits for rock drilling, as saw teeth, as dies for drawing wire and in cutting, boring and grinding tools used in connection with the motor and other industries where exceedingly hard metals have to be acted upon and where great precision is required.

The diamonds thus employed are not those used for ornamental purposes; but are, so far as appearance is concerned, stones of an inferior character. They are not ground or polished but are irregular in shape and are generally called borts or carbonados. Nevertheless, tools set with diamonds have heretofore been exceedingly expensive and their employment has been limited to those mechanical operations in which the use of diamonds is indispensable.

As my application shows, excessive heat affects these diamonds adversely; and it has been found that in most instances the critical point at which the desirable
16 qualities of the diamond are impaired is in the
neighborhood of 1380° Centigrade.

One method of setting the stones formerly employed has been to run molten metal around the diamonds. Metals sufficiently hard to hold the stone properly have been found to have a melting point above the critical one of 1380° Centigrade, above mentioned, and therefore tend to injure the diamond in the process of setting. Metals having a melting point lower than the critical one mentioned have been found to produce a setting not sufficiently rigid and hard to properly hold the stones.

The method heretofore generally employed in setting the stones has therefore been a hand process in which the stones are set by peening, hammering or bending the metal of the setting around the stone. Each stone must be set separately; and, in order to work the metal properly around the stone, it is necessary to have relatively large stones that present an ample girth or as it is technically called a pronounced girdle or equator over which the metal can be worked. In order to carry out this hand operation, if hard metal is used, it is necessary to subject the setting to heat to admit of working the metal over the stone. Even so, it is not possible to make the setting fit into all the irregularities of the submerged portion of the stone. Stones so set, when subjected to use against hard metal or rock, fre-

quently work loose in their setting. When this occurs, they sometimes fall out and are lost (an expensive matter); or,
when loosened but not entirely freed of their setting,
17 the diamonds, by frictional engagement with the
setting, quickly destroy it, thereby rendering the
tool useless.

It has been the practice to re-set the stones when they work loose; but repeated resettings, especially if heat is used, have a very deleterious effect upon the diamonds and render them unserviceable in the task for which they were intended. There is also considerable loss from breakage of the diamonds,—as high as five percent,—in setting or resetting according to the peening or hammering process. When the tools, in which the diamonds are set by peening and hammering the metal around the diamonds, are in use, due to the impossibility, heretofore referred to, of working the metal into contact with every portion of the irregular submerged surface of the stone, the heat generated during such use is not carried away by the metal of the setting as rapidly as it would be if there were contact, between the metal of the setting and the stone, at all points.

Attached to this affidavit is a sample of a setting in which diamonds are held in place by peened metal, marked Exhibit A, and a setting embodying the invention here in controversy, marked Exhibit B.

The setting of my invention is characterized by the fact that a hard metal setting is provided that engages the stones at all points of their irregular submerged surfaces without bringing the material of which the setting is composed to the point of melting. The setting of my inven-
tion is produced by sintering a comminuted mass
18 of material, consisting principally of molybdenum,
cobalt and copper, to shrink it into close adherence
(technically called "wetting") to the diamonds, at a temperature of 1245° to 1260° Centigrade, which is well below the critical point of impairment, i. e. 1380° Centigrade, thereby obtaining in the setting the advantage of the hard metal molybdenum, whose melting point is 2535° Centigrade.

The setting of my invention is further characterized in that the stones are mechanically set therein instead of being individually set by hand. Therefore, no peening or working of the metal around the stones is necessitated and smaller diamonds may be used. The relative cost of a setting made as heretofore by hand and the setting of my invention is as follows: stones used in hand-made settings cost approximately $9.35 per carat; those used in my settings cost approximately $6.00 per carat. With hand-made settings by the peening method, one man can make in one day two tools each provided with 40 diamonds. With the setting of my invention, one man can make in one day ten tools each provided with 224 diamonds. Consequently tools provided with my diamond setting are much cheaper and therefore the use of the diamond set tools in mechanical operations where they are advantageous, although not indispensable, is no longer prohibitory.

It has been found that core-bits for drilling rock provided with my setting will drill without impairment of the tool an average of 2900 feet while core-bits provided by the peening method with hand-made settings and drilling in the same rock will only drill an average of 600 feet.

19 The diamond setting of my invention has gone into extensive use as will be seen from the attached Schedule C showing some of the users of tools provided with my setting, and has superseded, both here and abroad, settings made by hand. Notwithstanding that much cheaper stones are employed in my setting than could heretofore be utilized for the purpose, and that the life of the diamonds in my setting is longer than in other settings, the total sales of my settings from 1932 to April 30, 1938 amount to $1,023,981.72.

CHARLES J. KOEBEL

Subscribed and Sworn to before me this 12th day of May, 1938.

JULIETTE HARRIS
(Seal) *Notary Public*
N. Y. Co. Clk's No. 44, Reg. No
0H207 Certificate filed Westchester County

Commission expires March 30, 1940

20 *Schedule C*

Principal users

Ford Motor Co.	Dearborn, Mich.
Chevrolet Motor Co.	Flint, Mich.
Chevrolet Motor Co.	Buffalo, N. Y.
Buick Motor Co.	Flint, Mich.
Pontiac Motor Co.	Pontiac, Mich.
Chrysler Motor Co.	Detroit, Mich.
Packard Motor Co.	Detroit, Mich.
Excello Tool Co.	Detroit, Mich.
Burroughs Adding Mach. Co.	Detroit, Mich.
Kelvinator Nash Corp.	Detroit, Mich.
Detroit Gear & Mach. Co.	Detroit, Mich.
U. S. Rubber Co.	Detroit, Mich.
Timken Axle Co.	Detroit, Mich.
General Motors Corp.	Flint, Mich.
A. C. Spark Plug Co.	Flint, Mich.
Cadillac Motor Co.	Detroit, Mich.
Chicago Pneumatic Tool Co.	Detroit, Mich.
Continental Motors Co.	Detroit, Mich.
Fisher Body Co.	Detroit, Mich.
Atkinson Topeka & Santa Fe. RR	
Grand Trunk Western R. R. Co.	Battle Creek, Mich.
New York Central Lines	All Shops
Illinois Central	All Shops
Erie Railroad	
Pennsylvania Railroad	
21 Southern Pacific Lines	
Michigan Central Lines	
B & O Railroad	
Norge Div. Borg Warner	Muskegon, Mich.
Parke Davis Co.	Detroit, Mich.
L. A. Young Spring Co.	Detroit, Mich.
University of Michigan	Ann Harbor, Mich.
Wilcox Rich Corp.	Marshall, Mich.
Garwood Industries	Detroit, Mich.
General Motors Truck Co.	Pontiac, Mich.
Hoover Ball Bearing Co.	Ann Arbor, Mich.
Great Lakes Steel Co.	Detroit, Mich
Lufkin Rule Co.	Saginaw, Mich.
Macklin Grinding Wheel Co.	Jackson, Mich.

U. S. Navy Yard	Portsmouth, N. H.
American Can Co.	Newark, N. J.
American Hard Rubber Co.	Butler, N. J.
Aluminum Co. of America	Pittsburgh, Pa.
Crucible Steel Co. of America	Harrison, N. J.
DeLaval Steam Turbine Co.	Trenton, N. J.
DuPont Viscaloid Co.	Arlington, N. J.
Eclipse Aviation Co.	E. Orange, N. J.
General Electric Co.	All branches
Gould & Eberhardt	Newark, N. J.
Hyatt Roller Bearing Co.	Harrison, N. J.
22 Ingersoll Rand Co.	Phillipsburg, N. J.
Johns Manville Prods. Co.	Manville, N. J.
Mack Truck Co.	Plainfield, N. J.
Manhattan Rubber Co.	Passaic, N. J.
Westinghouse Elect. Co.	All branches
Worthington Pump Co.	Harrison, N. J.
Wright Aero Corp.	Paterson, N. J.
American Car & Fdry. Co.	New York
American Radiator Co.	New York
American Safety Razor Co.	New York
Amtorg Trading Co.	New York
Bell Telephone Laboratories	New York
E. W. Bliss Co.	New York
Carborundum Co.	Niagara Falls, N. Y.
Carrier Corp.	Syracuse, N. Y.
Clipshave Co.	Portchester, N. Y.
Curtis-Wright Co.	Buffalo, N. Y.
Corning Glass Co.	Corning, N. Y.
DuPont Rayon Co.	Buffalo, N. Y.
Eastman Kodak Co.	Rochester, N. Y.
General Cable Co.	Buffalo, N. Y.
Gleason Works	Rochester, N. Y.
Goulds Pumps	Senaca Falls, N. Y.
Houde Engineering Corp.	Buffalo, N. Y.
International Bus. Mach. Co.	All branches
Lehigh Valley R. R. Co.	
Ludlum Steel Co.	Dunkirk, N. Y.
News Syndicate Co.	New York
Oneida Company	Oneida, N. Y.

23 Remington Arms Co.	Ilion, N. Y.
Remington Rand Co.	Towanda, N. Y.
Ritter Dental Mfg. Co.	Rochester, N. Y.
S. K. F. Industries	New York
Sperry Gyroscope Co.	Brooklyn, N. Y.
Frigidaire Corp.	Dayton, Ohio.
B. F. Goodrich Co.	Akron, Ohio.
Greyhound Management Co.	Cleveland, Ohio.
Kent-Owen Machine Co.	Toledo, Ohio.
Libby Glass Co.	Toledo, Ohio.
National Acme Co.	Cleveland, Ohio.
National Carbon Co.	Cleveland, Ohio.
National Cash Register Co.	Dayton, Ohio.
National Supply Co.	Toledo, Ohio.
National Tube Co.	Pittsburgh, Pa.
Otis Steel Co.	Cleveland, Ohio.
Republic Steel Co.	Cleveland, Ohio.
Spicer Mfg. Co.	Toledo, Ohio.
Thompson Products Co.	Cleveland, Ohio.
Timken Roller Bearing Co.	Canton, Ohio.
Wheeling Steel Co.	Yorkville, Ohio.
White Motor Co.	Cleveland, O.
York Ice Mchry. Co.	Canton, O.
Whitin Engine Co.	Cleveland, O.
Armstrong Cork Co.	Lancaster, Pa.
Atlantic Refining Co.	Philadelphia, Pa.
Auto-car Co.	Ardmore, Pa.
Bethlehem Steel Corp.	Bethlehem, Pa.
24 Henry Disston Co.	Philadelphia, Pa.
Hygrade Sylvania Co.	Emporium, Pa.
Landis Tool Co.	Waynesboro, Pa.
International Motor Co.	Allentown, Pa.
Midvale Co.	Nicetown, Pa.
U. S. Naval Aircraft Fcty.	Philadelphia, Pa.
Pitts. & Lake Erie R. R.	Pittsburgh, Pa.
Sharon Steel Hoop Co.	Sharon, Pa.
Superior Steel Corp.	Carnegie, Pa.
Union Switch & Signal Co.	Swissvale, Pa.
Westinghouse Airbrake	Wilmerding, Pa.
General Fire Extinguisher Co.	Providence, R. I.
U. S. Naval Torpedo Station	Newport, R. I.
Brown & Sharpe Mfg. Co.	Providence, R. I.

St. Louis S. Francisco Rwy.	
Gulf Colorado & Santa Fe	
Hughes Tool Co.	Houston, Texas.
Jones & Lamson Machine Co.	Springfield, Vt.
Norfolk & Southern R. R.	
Hazel Atlas Glass Co.	Wheeling, W. Va.
Weirton Steel Co.	Weirton, W. Va.
Allis-Chalmers Mfg. Co.	Milwaukee, Wis.
Briggs & Stratton Corp.	Milwaukee, Wis.
Bucyrus Erie Co.	Milwaukee, Wis.
J. I. Case Co.	Racine, Wisc.
Electric Auto-lite Corp.	Toledo, Ohio.
Fairbanks Morse Co.	Beloit, Wis.
Four-Wheel Auto-Drive Co.	Clintonville, Wisc.
International Harvester Co.	All branches
Kohler Co.	Kohler, Wisc.
25 Massey-Harris Co.	Racine, Wisc.
Caterpillar Tractor Co.	Peoria, Ill.
Ford Motor Co.	Canada
General Motors Co.	Canada
Union Pacific Railroad	
Gardner Denver Co.	Denver, Colo.
American-Brass Co.	Waterbury, Conn.
Bullard Co.	Bridgeport, Conn.
Colt Patent Fire Arms Co.	Hartford, Conn.
New Departure Mfg. Co.	Bristol, Conn.
New Haven Clock Co.	New Haven, Conn.
Pratt & Whitney Aircraft Corp.	Hartford, Conn.
Royal Typewriter Co.	Hartford, Conn.
Yale & Towne Mfg. Co.	Stanford, Conn.
U. S. Naval Gun Factory	Washington, D. C.
U. S. Navy Yard	Washington, D. C.
John Deere Tractor Co.	Waterloo, Iowa.
Maytag Co.	Newton, Iowa.
Borg & Beck Co.	Chicago, Ill.
Chicago, Burlington & Quincy	
Chicago, Milwaukee & St. Paul	
Chicago, R. I. & Pac. R. R.	
Eclipse Lawn Mower Co.	Prophetstown, Ill.
Hurley Machine Co.	Chicago, Ill.
Matthiesen & Hegeler Zinc Co.	LaSalle, Ill.
Rock Island Arsenal	Rock Island, Ill.

	Stewart-Warner Corp.	Chicago, Ill.
	Western Cartridge Co.	E. Alton, Ill.
	Western Electric Co.	Chicago, Ill.
	E. C. Atkins Co.	Indianapolis, Ind.
26	Ball Brothers	Muncie, Ind.
	Bendix Products	South Bend, Ind
	Delco Remy Corp	Anderson, Ind
	Guide Lamp Co	Anderson, Ind
	Indiana State Prison	
	LaSalle Steel Co	Hammond, Ind
	Nicholson File Co	Anderson, Ind
	Perfect Circle Co	Hagerstown, Ind
	Studebaker Corp	South Bend, Ind
	U. S. Slicing Machine Co	Laporte, Ind
	Youngstown Sheet & Tube Co	
	Hillerich & Bradsby Co	Louisville, Ky
	American Optical Co	Southbridge, Mass.
	American Thread Co	Holyoke, Mass.
	Bethlehem Shipbuilding Corp	Quincy, Mass.
	Boston & Albany R. R.	
	Christian Science Pub. Co.	Boston, Mass.
	Heald Machine Co.	Worcester, Mass.
	Leland Gifford Co.	Worcester, Mass.
	Norton Co.	Worcester, Mass.
	Reed & Barton Co.	Taunton, Mass.
	Supply Off. Navy Yard	Boston, Mass.
	Springfield Armory	Springfield, Mass.
	L. S. Starrett Co.	Athol, Mass.
	United Shoe Mchry. Co.	Beverly, Mass.
	Warren Telechron Co.	Ashland, Mass.
	Watertown Arsenal	Watertown, Mass.
	G. L. Martin Co.	Baltimore, Md.
27	Minneapolis Moline Power Co.	Minneapolis, Minn.
	Northwest Airlines	St. Paul, Minn.
	International Shoe Co.	St. Louis, Mo.
	Pomona Pump Co.	
	Sullivan Machinery Co.	Michigan City, Ind.
	American Fork & Hoe Co.	Geneva, Ohio.
	Babcock & Wilcox	Barberton, O.
	American Steel & Wire Co.	Cleveland, O.
	Black & Decker Elect. Co.	Kent, O.
	Canton Tin Plate Corp.	Canton, O.

Carnegie Ill. Steel Corp.	McDonald, O.
Carnegie Steel Co.	Youngstown, O.
Chase Brass & Copper Co.	Cleveland, O.
Cleveland Tractor Co.	Cleveland, O.
Conklin Pen Co.	Toledo, O.
Crosley Radio Corp.	Cincinnati, O.
Delco Products Co.	Dayton, O.
Firestone Tire & Rubber Co	Akron, O.
Swedish Diamond Boring	Stockholm, Sweden
SKF	Gothenburg, Sweden
Bristol Aeroplane	Bristol, England
London & Northeastern R. R.	
Ford Motor Co	England
Rolls Royce	England
Morris Bros.	Coventry, England
Austin Motor	Birmingham, England
28 Birmingham Small Arms Co.	Birmingham, England
Humber Limited	Coventry, England
Napier & Son Ltd.	London
Renault	Paris
Delage Motors	Paris
Matford	France
Campagnie General Transatlantique	Harve, France
Lancia & Co	Torino
Alfa Romeo	Milan
Can. General Electric Co.	Canada
McKinnon Industries	Canada
Kenora Paper Mills	Kenora, Can.
Ontario Paper Co	Thorold, Can.
Parker Fountain Pen Co	Toronto
Pratt & Whitney	Dundas
Can. Sullivan Mchry. Co. 9	Dundas
Steel Co. of Canada	Hamilton
Sunshine Waterloo Co	Waterloo Canada
Toronto Transportation Comm.	Toronto
Victor Talking Machine Co.	Toronto
Western Clock Co.	Petersborough
Alum. Co. of Canada	
Anacando Brass Co	Toronto

Bakelite Corp. of Can.	Toronto
Hollinger Gold Mines	
Consolidated Coal Co.	Canada
Can. Acme Screw Co.	
Can. Fairbanks Morse Co.	
Can. Ingersoll Rand. Co.	
Can. Kodak Co.	
29 Canadian Nat'l Railways	Toronto
Can. Pacific RR	“
Can. Westinghouse Ltd.	
Dominion Button Co	Kitchener, Ont.
Continental Can Co	Toronto
Brown, Cork & Seal Co	Toronto
Henry Disston Co	Toronto
Exide Batteries	Toronto
Graham Nail & Products	“
Gray Forgings & Stamp	“
Hamilton Gear & Mach	“
Hayes Wheel & Forgings	
Hoover Co	Hamilton
H. Onstad	Norway, Oslo.
Societa Ahonima Fiat	Torino, Italy.
Salvador Markowicz	Brazil
Otto Dohmen & Co	Vienna Austria
H. V. McKay Massey Harris Pty	Victoria, Australia
Cia Mexicanno DeLamparas Electicas	Monterrey, Mexico

30 District Court of the U. S. for the D. of C.
Case No. 61481 Date May 19, 1938 Exhibit No.
In Evid. Plaintiff's 1

390

P-1

Department of Commerce

United States Patent Office

To all persons to whom these presents shall come Greeting:

This is to Certify that the annexed is a true copy from the records of this office of the Original Petition, Specification and Oath; Papers 2 to 13, inclusive; and Papers 15 and 22, in the matter of the

Pending Application of Charles J. Koebel, Filed January 12, 1932, Serial Number 586,238, for Improvement in Base Metal Alloys.

Filed May 23 1938

In Testimony Whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed, at the City of Washington, this fifth day of May, in the year of our Lord one thousand nine hundred and thirty-eight and of the Independence of the United States of America the one hundred and sixty-second.

CONWAY P. COE
(Seal) *Commissioner of Patents.*

Attest:
D E WILSON
Chief of Division.

31 Endorsed: Mail Division Jan 12 32 U. S. Patent Office
586238

Endorsed: Jan 12 32 407829 B "Check— 25.00 Rec'd U. S. Patent Office Paper No. 1 Application

Petition and Power of Attorney

To the Commissioner of Patents:

Your petitioner, Charles J. Koebel, a citizen of the United States of America, resident of Detroit, county of Wayne, and state of Michigan, Post Office address 1200 Oakman Boulevard, Detroit, Michigan, prays that letters patent may be granted to him for the new and useful improvements in Base Metal Alloys set forth in the annexed specification.

He hereby appoints Axel V. Beeken of 233 Broadway, New York, N. Y., his duly authorized attorney, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to sign the drawings, to receive the patent, and to transact all business in the Patent Office connected therewith.

Signed at Detroit, in the county of Wayne, and state of Michigan, this 9th day of January, 1932.

CHARLES J. KOEBEL

32

Specification

To All Whom It May Concern:

Be it known that I, Charles J. Koebel, a citizen of the United States of America, resident of Detroit, in the county of Wayne, and state of Michigan, have invented certain new and useful improvements in Base Metal Alloys of which the following is a specification:

This invention relates generally to alloys and has more particularly reference to alloys used for the purpose of setting diamonds, carbonados or the like. The present application is a division of application (Ser. No. 462,485, filed June 20, 1930.) (patent # 1,848,182 class 29/160.5)

Diamonds are now being used to a very great extent in the industrial arts, examples of such use being: as dressing tools for grinding wheels; as core bits for rock drilling; as saw teeth; and as dies for drawing wire. Manifestly their use for such purposes as have been indicated above, imposes strains and stresses of considerable magnitude upon the diamonds and their mountings. Unless the diamond is held very firmly in its mounting, it may work loose and become lost or, if not lost, it will quickly destroy its own setting and will become useless as a tool. It is the practice now to use relatively large stones and to reset them when they work loose. Repeated resettings however, especially if heat be used, have a very deleterious effect upon the diamond, and it is therefore not always possible to reset a diamond as it may have become injured or its "skin" may have been destroyed or penetrated, by adjacently mounted diamonds or otherwise, to such an extent that it is no longer serviceable in the task for which
33 it is intended.

It is the main object and feature of this invention to produce ~~an~~ a base metal (per B) alloy B′ (Insert B′) which possesses such characteristics that when subjected to heat at a point below ~~the~~ said (per B) critical point ~~at which the desirable qualities of the diamond are impaired,~~ (per B) said alloy exhibits the property of wetting the diamond coupled with a lack of avidity for the carbon of the diamond, and when thereafter cooled of closely adhering to it.

The critical point above mentioned appears to be in most cases in the neighborhood of 1380 degrees centigrade, although it varies with different stones. Excellent results have been obtained by using a temperature between 1245 and 1260 degrees centigrade.

By way of example, but not of limitation, the following formulae of an alloy, successfully used are given, the percentages stated being approximate (per B):

Example No. 1

Molybdenum	26%
Cobalt	46%
Copper	27.75%
Iron	00.25%
	100%

Example No. 2

Molybdenum	40%
Cobalt	20%
Copper	40%
	100%

34 The proportions given are by weight and not by volume. The materials of which the alloy is composed are reduced to powder form and thoroughly mixed, a slight amount of paraffine being added, before the diamond is imbedded therein. Molybdenum is chosen because, apparently, it imparts a hardness of high degree to the finished setting. The function of the cobalt appears to be that of rendering the alloy wettable with respect to the diamond. The copper seems to prevent the alloy from robbing the diamond of carbon.

35 The diamond or diamonds are imbedded in a mass of the comminuted alloy of the character described, after which said alloy is subjected to pressure so as to shape it. The pressure used may be from thirty to forty tons to the square inch, and causes the mass to be shaped into a body capable of substantially maintaining its form when pressure is thereafter removed. The shaped body is then introduced into a furnace and heated to a temperature below the critical point above mentioned, say 1245 degrees centigrade, said furnace being devoid of oxygen,

after which the mass is cooled in a chamber also devoid of oxygen. If desired, there may be a preliminary heating of the shaped body in another furnace, also devoid of oxygen, and good results have been obtained in the case of the material of example No. 1 with a preliminary heating of 400 degrees centigrade, and in the case of the material of example No. 2 with a preliminary heating of 650 degrees centigrade and a final heating of 1225 degrees centigrade.

During the heating, the body has shrunk but slightly but has become a coherent solid sintered mass in which the diamonds are imbedded in the same relative position they originally occupied, and it would therefore seem that the effective coefficient of expansion of the alloy approximates that of the diamond.

I Claim:

36 1. As a new article of manufacture, a setting for diamonds or the like composed of an alloy of base metals including molybdenum, copper and cobalt, said metals being present in such proportions that the alloy, when sintered at a temperature below that of the critical point at which the desirable qualities of the diamond are adversely affected, exhibits the property of wetting the diamond coupled with a lack of avidity for the carbon thereof and, when thereafter cooled, of closely adhering to it.

2. As a new article of manufacture, a setting for diamonds or the like composed of an alloy of base metals including molybdenum, copper and cobalt, said metals being present in such proportions that the alloy, when sintered at a temperature below approximately 1380 degrees centigrade, exhibits the property of wetting the diamond coupled with a lack of avidity for the carbon thereof and, when thereafter cooled, of closely adhering to it.

[Matter enclosed between rules erased in copy.]

3. As a new article of manufacture, a setting for diamonds ~~or the like~~ (No example given in spec.) composed of an alloy including molybdenum, approximately twenty-six percent, copper approximately twenty-seven percent and cobalt approximately forty-six percent.

4. As a new article of manufacture, a setting for diamonds ~~or the like~~ composed of an alloy including molyb-

denum approximately forty percent, copper approximately forty percent, and cobalt approximately twenty percent.

Signed at Detroit, in the county of Wayne, and
37 state of Michigan, this 9th day of January, 1932.

CHARLES J. KOEBEL

OATH

STATE OF MICHIGAN,
County of Wayne, ss:

Charles J. Koebel, the above-named petitioner, being duly sworn, deposes and says: that he is a citizen of the United States of America and a resident of Detroit, in the county of Wayne and state of Michigan, and that he verily believes himself to be the original, first, and sole inventor of the improvements in Base Metal Alloys described and claimed in the annexed specification; that he does not know and does not believe that the same were ever known or used before his invention or discovery thereof; or patented or described in any printed publication in any country before his invention or discovery thereof or more than two years prior to this application; or in public use or on sale in the United States of America for more than two years prior to this application; that said invention has not been patented in any country foreign to the United States of America on an application filed by him or his legal representatives or assigns more than twelve months prior to this application and that no application for patent on said improvement has been filed by him or his representatives or assigns in any country foreign to the United States of America.

CHARLES J. KOEBEL

Sworn To And Subscribed before me, this 9th day of January, 1932.

CARROLL R. ALDEN
(Seal) *Notary Public*

My commission expires Sept. 4, 1939

38 Div. 3 Room 4093 260 L:L Paper No. 2

Department of Commerce, United States Patent Office
Washington
Feb 18 1932

Please find below a communication from the Examiner in charge of this application.

THOMAS E. ROBERTSON
Commissioner of Patents.

Applicant: Charles J. Koebel Ser. No. 586,238 Filed Jan. 12, 1932 For Base Metal Alloys.

Axel V. Beeken, 233 Broadway, New York, N. Y.

While the claims are in the form of a setting for diamonds, the claims in substance cover only an alloy and are so construed. Claims 1 and 2 are rejected as not pointing out applicant's invention under R. S. 4888. Merely stating in such proportions as to accomplish a certain result is not sufficiently defined. Applicant should claim his alloy by stating the elements of which it is composed, and the per cent of his elements within the limits disclosed.

Claims 3 and 4 appear allowable as at present advised. However, claims 3 and 4 each cover a different species of applicant's alloy, and since no generic claim is found allowable, applicant is required to elect between these two species.

No pertinent art has been found as the result of a search.

A LINDSEY
Examiner.

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39 Mail Division Aug-5 32 U. S. Patent Office 1921
#3 Amendment A. U. S. Patent Office Aug-6 1932

Div. 3.

In the United States Patent Office.

Div. 3; Room 4093

Charles J. Koebel Ser. No. 586,238 Filed Jan. 12, 1932
Base Metal Alloys

In response to Office Action of February 18, 1932
New York, New York, Aug. 2, 1932

The Commissioner of Patents,
Washington, D. C.

Sir:

Please amend this case as follows:

Insert the following claims:

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5. As a new article of manufacture, a setting for diamonds (or the like) composed of an alloy of base metals including molybdenum, copper and cobalt, thereby characterized that when said alloy is sintered, at a temperature below that of the critical point at which the desirable qualities of the diamond are adversely affected, it exhibits the property of wetting the diamond coupled with the lack of avidity for the carbon thereof and, when thereafter cooled, of closely adhering to it.

6. As a new article of manufacture, a setting for diamonds or the like composed of an alloy of base metals thereby characterized that when said alloy is sintered, at a temperature below that of the critical point at which the desirable qualities of the diamond are adversely affected, it exhibits the property of wetting the diamond coupled with a lack of avidity for the carbon thereof and, when thereafter cooled of closely adhering to it.

[Matter enclosed between rules erased in copy.]

40 *Remarks*

It is believed that the introductory statement contained in the claims is proper. See "Patent Claim Drafting" by Stringham Section 5625 pp. 257-58 and the cases there cited.

Applicant has made an invention; that much is admitted. In his specification he gives two examples of the proportions he may use. These proportions are such that it is impossible to write a claim, giving proportions, that will cover both examples.

Applicant in claims 1 and 2 has stated the characteristics of his new article of manufacture or alloy. There is no art cited showing any alloy having similar characteristics. If an alloy has new and desirable characteristics it may be claimed either by setting forth in the claims the propor-

tions or the characteristics. See *Ex parte* Ellis C. D. 1928 p. 35 where Assistant Commissioner Moore says:
"he is entitled to claim either the solution having such new and desirable properties, or a solution having such specific ingredients."

and Stringham (supra) heads his Section 5180 with the words:

"A composition may be defined by its properties or by its ingredients."

So also Examiner Lewers in his article on Composition of Matter in the July 1922 number of the Journal of the Patent Office Society says (p. 544) that the identifying and distinguishing characteristics of the composition should be stated in lieu of proportions.

See also *Cookingham* v. *Warren* 3 F (2) 899 and the claim there sustained.

41 Now an examination of claims 1 and 2 reveals that the properties of the alloy are clearly set forth, but applicant has in addition stated not only the elements of which the alloy is composed but also that they shall be present in such proportions that the resulting product will have these desirable characteristics. It is not seen that this is objectionable. But if the Examiner prefers the form expressed by claims 5 and 6 submitted herewith, applicant is agreeable.

Reconsideration and allowance are requested.

Respectfully submitted,

AXEL V BEEKEN
Attorney for Applicant

42 Div. 3 Room 4093 260 Paper No. 4

Mailed Sep 1—1932

Department of Commerce United States Patent Office
Washington

Please find below a communication from the Examiner in charge of this application.

THOMAS E. ROBERTSON
Commissioner of Patents.

11-8623

Applicant: Charles J. Koebel Ser. No. 586,238 Filed January 12, 1932 For Base Metal Alloys

Axel V. Beeken 233 Broadway New York, N. Y.

Responsive to amendment filed Aug. 5, 1932.

Division has been approved by the Examiner of Classification between claim 3 and claim 4 as covering different species with no allowable generic claim.

The requirement is therefore repeated and made final.

Further action on the merits will be given when the above requirement is complied with.

A. LINDSEY
Examiner.

43 Endorsed: Mail Division Feb 28 33 U. S. Patent Office

1921 #5 Letter B

Endorsed: U. S. Patent Office Mar 1-1938 Div 2

In the United States Patent Office

Div 3, Room 4093

Charles J Koebel, Ser. No. 586,238, Filed January 12, 1932, Base Metal Alloys

In response to Office action of Sept. 1, 1932

New York, N. Y., February 28, 1933

The Commissioner of Patents,
Washington, D. C.

Sir:

Applicant elects to stand on claim 3 of this application. He desires to reserve his right to appeal on the question of division until the case is otherwise finally acted upon. It is requested that action on the merits be now given.

Respectfully,

AXEL V BEEKEN
Attorney for Applicant.

44 Div. 3 Room 4093 260 L:L Paper No. 6

Endorsed: Mar. 7-1933

Department of Commerce United States Patent Office
Washington

Please find below a communication from the Examiner in charge of this application.

THOMAS E. ROBERTSON
Commissioner of Patents.

Applicant: Charles J. Koebel Ser. No. 586,238 Filed January 12, 1932 For Base Metal Alloys

Axel V. Beeken 233 Broadway New York, N. Y.

Responsive to letter of Feb. 28, 1933

In the claims, the terms "or the like" are objectionable, and should be cancelled.

Claims 1, 2, 5, and 6 are rejected as not complying with R. S. 4888, since no proportions of the elements are claimed, and claim 6 does not even state what the elements are. Merely stating that they are in such proportions as to accomplish a certain result is not sufficiently definite. In claims 1, 5 and 6, applicant does not state the sintering temperature. If there is a critical temperature at which the result is accomplished, such temperature should be embodied in the claims.

Claims 1, 2, 5 and 6 are further rejected as claiming the compound by the treatment and use of the compound. If applicant has invented a compound, he should claim it by stating the elements of which it is composed, and the amount of each within the limits disclosed.

It is noted that applicant elects the alloy covered by claim 3, hence no action on the merits of claim 4 is given. It is noted, however, that in both claims 3 and 4, no disclosure of "approximately" the amounts of the elements is found in the specification and in claim 3 the percentages claimed are not disclosed in the specification, and the amount of the elements total only 99%. Claim 3 is rejected for the above reason. When this claim is amended by including 100% of the elements, by omitting "or the like" and by furnishing a proper basis in the specification for the subject matter, this claim would appear allowable, as at present advised.

A. LINDSEY
Examiner.

45 Endorsed: Mail Division Sep 5—33 U. S. Patent Office

Endorsed: U. S. Patent Office Sep 7—1933 Div. 3

1921 #7 Argument

In the United States Patent Office

Div. 3, Room 4093

Charles J. Koebel, Ser. No. 586,238, Filed Jan. 12, 1932, Base Metal Alloys,

In response to Office action of March 7, 1933.

New York, N. Y., September 6, 1933.

The Commissioner of Patents,
Washington, D. C.

Sir:

Argument

It is not seen that the words "or the like" are objectionable. The specification states that the invention relates to settings for diamonds, carbonados or the like. It is perfectly plain what applicant means—there is no vagueness about it, and hundreds of patents are granted containing phrases of the character indicated.

As pointed out in applicant's amendment dated August 2, 1932 it is not necessary to insert the proportions of the elements in claims 1, 2, 5 and 6 and it is therefore error to reject them on R. S. 4888. The temperature of 1380° given in claim 2 is not the sintering temperature, but is the critical temperature at which most of the precious stones used by applicant are found to lose their valuable properties. But other precious stones might have different critical temperature points. Applicant gives in his specification suitable temperatures for accomplishing the sintering viz: 1245 or 1260 degrees centigrade. The Examiner evidently believes that 1380 degrees centigrade is a critical sintering temperature.

46 The Examiner further rejects claims 1, 2, 5 and 6 because they are alleged to claim the compound by the treatment and use of the compound. What of it? The characteristics of the compound can be ascertained by making certain tests which are expressed in the claims—a method quite common in claim writing in cases of this character. It so happens that these tests must necessarily be used in utilizing the compound. Thus there are defined in the claims definite and positive characteristics that will necessarily reveal themselves. So far from being objectionable this should be welcomed, because by these tests it can always be ascertained whether or not a given compound is the compound of the patent. In other words: the expressions used make for centainty and definiteness.

Claim 3 is likewise believed to be allowable. It is not necessary that the elements total 100% because the claim says "including" and "approximately". Example No. 1 of the specification is believed to furnish a proper basis for claim 3.

Reconsideration and allowance are requested.

Respectfully submitted,
AXEL V BEEKEN
Attorney for Applicant

47 Div. 3 Room 4093 260 L:L Paper No. 8

Endorsed: Mail Sep 12 1933

Department of Commerce United States Patent Office
Washington

Please find below a communication from the Examiner in charge of this application.

CONWAY P. COE
Commissioner of Patents.

Applicant: Charles J. Koebel Ser. No. 586,238 Filed January 12, 1932 For Base Metal Alloys

Axel V. Beeken 233 Broadway New York, N. Y.

Responsive to amendment of Sep. 5, 1933.

The claims are objected to in the use of the term "or the like". Applicant's attention is called to Caldwell and Barr, 120 O. G. 2125 as authority for this objection.

Claims 1, 2, 5 and 6 are again rejected for all the reasons of record as fully stated in the last office letter.

Claim 4 remains in the case upon requirement for division and no action on its merits is given.

Claim 3 is again rejected for the reasons of record, but may be allowed when amended as suggested in the last office letter.

Applicant's argument is noted, but applicant has not shown any reason why the rejection is not sound. In fact applicant has not answered the reasons for rejection. Applicant has not stated any reason why it is not necessary to insert portions of the elements, and as regarding the rejection that applicant is claiming the compound by its treatment and use the only argument furnished against this is: "What of it?" Applicant further states that the characteristics of the compound may be ascertained by making tests. However, the Office has no means of testing the compounds to ascertain their characteristics and there would be many compounds formed of these elements and which compounds would have many and varied characteristics, for example, claims 1, 2 and 5 might include less than one percent of the elements named, and the rest of the compound could be any one of the other numerous elements in Mendeleef's table. Clearly, these claims do not define any definite alloy or any alloy that would have any fixed characteristics. 48

Claim 6 is still broader and covers only base metals.

Applicant should prepare the case for final action.

A. LINDSEY
Examiner.

49 Endorsed: Mail Division Mar—7 34 U. S. Patent Office

Endorsed: U. S. Patent Office Mar 8 1934 Division 3

1921 #9 Argument

In the United States Patent Office

Div. 3, Room 4093

Charles J. Koebel, Ser. No. 586,238, Filed Jan. 12, 1932 Base Metal Alloys, In response to Office action of Sept. 12, 1933.

New York, N. Y., March 7, 1934

The Commissioner of Patents,
Washington, D. C.

Sir:

Remarks

It is apparent that an issue has been reached between the Examiner and the applicant. Applicant has already stated his position and there can be no object in again traversing the matter.

Applicant therefore asks for reconsideration and allowance or final rejection.

Respectfully submitted,

AXEL V BEEKEN
Attorney for Applicant

50 Div. 3 Room 4093 260 L:L Paper No. 10

Endorsed: Mar 13 1934

Department of Commerce United States Patent Office
Washington

Please find below a communication from the Examiner in charge of this application.

CONWAY P. COE
Commissioner of Patents.

Applicant: Charles J. Koebel Ser. No. 586,238 Filed January 12, 1932 For Base Metal Alloys

Axel V. Beeken 233 Broadway New York, N. Y.

Responsive to amendment of Mar. 7, 1934

The following patents are cited:

Fahrenwald, 1,346,190 July 13, 1920 75-1 Ni
Sattler, 1,773,793 Aug. 26, 1930 ” ” Cu Steels
(Brit.) Tigerschiold, 331,414 July 3 1930 ” ” ” ”

The claims are 1 to 6, inclusive.

Claim 4 remains in the case on applicant's election of species, and no action on the merits of this claim is given.

Furthermore, no example is given in the specification of the alloy described in claim 4. Throughout the claims, the term "or the like" is objectionable and renders the claims indefinite. It is not understood what meaning applicant intends this expression to have in the claims.

All the claims are rejected as indefinite under R. S. 4888. Claim 3 does not include 100% of the elements and the terms "approximately" and "or the like" render this claim indefinite. When clearly drawn to state the elements of which the alloy is composed and the amount of each, this claim would appear allowable. While no action is given on the merits of claim 4, if amended as stated for claim 3, this claim would appear to contain patentable subject matter.

Claims 1, 2, 5 and 6 are indefinite as to the composition claimed. Take claim 5 for example, this claim covers an alloy of base metals including molybdenum, copper and cobalt and no proportions of these elements is stated. This claim might cover as low as 1% of each of these elements and 97% of some other element not named and not a part of the invention. While applicant states that he has a right to claim the composition of its characteristics, no authority is found for such statement and furthermore, applicant is not
claiming any definite characteristics. These claims
51 state that if certain things are done to the alloy it will
have certain characteristics, but this does not add patentability to the claims. These claims, as worded, cover only an alloy having a small amount of the three elements named, and claim 6 is still broader and does not even name any of the elements of the composition. The examiner's position regarding these claims was fully stated in the last office letter.

Claims 1, 2, 5 and 6 are also rejected on the art above. While these patents do not show applicant's specific composition disclosed and in fact disclose entirely different compositions, each of these patents discloses a composition containing various amounts of these three elements and that is all that applicant's claims cover.

Applicant's arguments have been thoroughly reviewed and it is still believed that the claims do not define any definite composition for the reasons above stated.

Since new reasons for rejection have been added, this rejection is not made final, but applicant may at his discretion consider the rejection final.

A. LINDSEY
Examiner.

52 Endorsed: Mail Division Sep 12 1934 U. S. Patent Office

Endorsed: U. S. Patent Office Sep 13 1934 Division 3

1921 # 11 Amendment B

Div. 3, Room 4093

Charles J. Koebel, Ser. No. 586,238, Filed Jan. 12, 1932, Base Metal Alloys

In response to Office action of Mar. 13, 1934.

New York, N. Y. Sept. 12, 1934

The Commissioner of Patents,
Washington, D. C.

Sir:

This case is hereby amended as follows:

Page 2, line 2, cancel "an" and insert: a base metal
Page 2, line 2, after "alloy" insert:

(B1)

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capable of being sintered at a temperature below that of the critical point at which the desirable qualities of the diamond are adversely affected and

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[Matter enclosed between rules erased in copy.]

Page 2, line 4, cancel "the" (first occurence) and substitute: said
Page 2, lines 4 and 5, cancel "at which the desirable qualities of the diamond are impaired"
Page 2, line 16, cancel the colon, substitute a comma, and insert: the percentages stated being approximate:
Cancel claims 1 and 2
Claim 3, line 2, cancel "or the like"
Claim 4, line 2, cancel "or the like"
Cancel claims 5 and 6.

53 Insert the following claim:

(B2)

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7. As a new article of manufacture, a setting for diamonds consisting of a base metal alloy the principal ingredients of which are molybdenum, copper and cobalt so proportioned as to be capable of being sintered at a temperature below that of the critical point at which the desirable qualities of the diamond are adversely affected, said alloy when so sintered having the property of wetting the diamonds coupled with a lack of avidity for the carbon thereof and, when thereafter cooled, of closely adhering to it.

[**Matter enclosed between rules erased in copy.**]

54 *Remarks*

In view of the action on the merits now given by the Examiner, the case has been amended as above set forth.

The patent to Fahrenwald relates to an alloy for firearms, said alloy consisting of copper and nickel with the addition of a slight amount of iron, chromium, manganese, molybdenum or tungston. The use to which this alloy is put is entirely different from that of the application, and there is nothing to indicate that the compound of the patent is capable of being sintered at a temperature below that of the critical point mentioned in the application or that such alloy possesses the characteristics recited by applicant.

The patent to Sattler is for an alloy for the production of permanent magnets and consists principally of a steel alloy containing carbon and manganese and in addition *one of* the following constituents: tungston, molybdenum, copper or cobalt in very small quantities. What this has to do with the present invention is not understood.

The British patent relates to an acid-resisting iron alloy consisting of iron, nickel, chromium, carbon, silicon and copper. This also is a far cry from what applicant is claiming.

Claim 7, presented herewith, is thought to bring out the invention sufficiently definitely to avoid the art. The alloy is said to consist *principally* of molybdenum, copper and cobalt and is capable of being sintered at a temperature below that of the critical point mentioned in the specification and has, in addition, the other qualities described. This claim is clearly allowable.

In regard to claims 3 and 4, the formal require-
55 ments have been complied with; and, in view of the
word "approximately" in claim 3 and the amendments made to the specification, it is thought that it is not necessary that the percentages given add up exactly to one hundred percent.

Reconsideration and allowance are requested.

Respectfully submitted

AXEL V BEEKEN
Attorney for Applicant

56 Div. 3 Room 4093 260 L:L Paper No. 12

Endorsed: Sep 18 1934

Department of Commerce United States Patent Office
Washington

Please find below a communication from the Examiner in charge of this application.

CONWAY P. COE
Commissioner of Patents.

Applicant: Charles J. Koebel Ser. No. 586,238 Filed January 12, 1932 For Base Metal Alloys

Axel V. Beeken 233 Broadway New York, N. Y.

Responsive to amendment of Sept. 12, 1934.

The claims remaining in the case are 3, 4 and 7.

Claim 7 submitted by last amendment is substantially the same as the claims previously submitted and cancelled. Claim 7 is rejected as too broad and indefinite. This claim covers no proportion of the elements which might be present in the claim. This claim is not sufficiently definite so that a person could make the alloy from the reading of the claim. The claim does not cover any definite alloy but attempts to claim the alloy by its characteristics or the results. Any one in making this alloy would have to experiment with the three elements named and possibly with a large number of other elements which would be included in the claim to ascertain what alloys would be capable of being sintered at the temperature desired and the desired temperature is not stated in the claim. When this alloy is ascertained further experimentation would be necessary to find which one of the resulting alloys have all of the three additional properties called for in the claim. This claim is also believed to be met by the art of record, which contains the three elements called for in the claim.

Claim 3 is again rejected for the reasons of record fully stated in the last Office letter. When amended as stated in the last Office letter, this claim would appear to be allowable.

While no action on the merits of claim 4 is given, in view of applicant's election and the absence of an allowable generic claim, applicant's attention is called to the
57 comments made on this claim in the last office letter.

Since an issue has been reached, this rejection is made final.

S. WOLFF
Actg Examiner

58 1921 #13 Amendment (not entered)

Endorsed: U. S. Patent Office Mar 19 1935 Division 3

In the United States Patent Office

Div. 3, Room 4093

Charles J. Koebel, Ser. No. 586,238, Filed Jan. 12, 1932, Base Metal Alloys,

In response to Office action of September 18, 1934.

New York, N. Y., March 15, 1935

The Commissioner of Patents,
Washington, D. C.

Sir:

Please amend the above case as follows:

In line 10 of the petition, cancel "Base Metal Alloys" and substitute: Settings For Diamonds

In line 4 of the preamble to the specification, on page 1, cancel "Base Metal Alloys" and substitute: Settings For Diamonds

Claim 3, line 4, cancel "twenty-seven" and substitute: twenty-eight

Remarks

The foregoing amendment is made for the purpose of placing this case in better form for appeal. Simultaneously with this there is being filed a formal appeal to the Board of Appeals.

Respectfully submitted,

AXEL V BEEKEN
Attorney for Applicant

59 L:G No. 15.

Endorsed: Mailed Mar 25 1935

United States Patent Office.

Before the Board of Appeals.

In re application of
Charles J. Koebel,
Serial No. 586,238
Filed: Jan. 12, 1932.
For: Base Metal Alloys.

Examiner's Statement.

This is an appeal from the decision of the Primary Examiner from the final rejection of claims 3, 4 and 7—all of the claims of the case—which claims read as follows:

3. As a new article of manufacture, a setting for diamonds composed of an alloy including molybdenum, approximately twenty-six percent, copper approximately twenty-seven percent and cobalt approximately forty-six percent.

4. As a new article of manufacture, a setting for diamonds composed of an alloy including molybdenum approximately forty percent, copper approximately forty percent, and cobalt approximately twenty percent.

7. As a new article of manufacture, a setting for diamonds consisting of a base metal alloy the principal ingredients of which are molybdenum, copper and cobalt (so proportioned as to be capable of being sintered at a temperature below that of the critical point at which the desirable qualities of the diamond are adversely affected) said alloy when so sintered having the property of wetting the diamonds coupled with a lack of avidity for the carbon thereof and, when thereafter cooled, of closely adhering to it.

The references relied upon are—

Fahrenwald	1,346,190	July 13, 1920	75/1
Sattler	1,773,793	Aug. 26, 1930	“
British	#331,414	Acc. July 3, 1930	75/1

The invention described and claimed is a setting for diamonds composed of an alloy including Mo, Cu and Co. Claim 7 is broad and claims 3 and 4 each cover a different
species of the alloy. Since no generic claim was
60 found allowable division was required between claims
3 and 4 which requirement was approved by the Examiner of Classification. Applicant then elected to prosecute claim 3, leaving claim 4 in the case in the event that a generic claim was found allowable.

Claim 3 was indicated to contain allowable subject matter, subject to certain changes. In this claim the term "approximately" was considered indefinite and broader than the specific disclosure on page 2 of the specification, which disclosure was limited to definite percentages of the elements. Claim 3 also, as formerly worded, contained only a total of 99% of elements. Applicant has filed an amendment with the appeal correcting this feature.

While no action on the merits was given for claim 4, it was indicated that this claim contained patentable subject matter and when amended to render it definite would be considered allowable.

The above patents, cited only against claim 7, were cited only to show that alloys containing the three elements mentioned were old. These patents were not considered to meet the invention.

Claim 7 stands rejected as too broad and indefinite. This claim covers no proportions of the elements which might be present in the alloy. The claim is not sufficiently definite so that a person could make the alloy from reading the claim. This claim does not cover any definite alloy but attempts to claim the alloy by its characteristics. Anyone making the alloy would have to experiment with the three elements named and possibly with a large number of other elements which would be included in the claim to ascertain what alloys would be capable of being sintered at the temperature desired and furthermore, the desired temperature is not stated in the claim. When this alloy 61 is ascertained further experimentation would be necessary to find which one of the resulting alloys would have all of the three additional properties called for in the claim. Such a claim does not properly define the invention and should not be allowed.

Applicant stresses the point that the claims do not cover an alloy per se but are drawn to a setting for a diamond. No structure is set forth and the claims in substance cover only the composition. For this reason the use of the composition is not considered to confer patentability.

It is noted that applicant has not disclosed a range of the elements of the alloy but has only disclosed two distinct species. Since it is not disclosed that he may use other proportions of the elements it is not seen how he can draw a patentable generic claim covering the two species.

Respectfully,

A. LINDSEY
Examiner, Div. 3.

62 Appeal 14.125 Paper No. 22

Decision. MM

Endorsed: U. S. Patent Office Board of Appeals Nov 23 1935 Mailed

Appeal No. 14,125

Hearing: October 30, 1935.

In the United States Patent Office

Before the Board of Appeals

Ex parte Charles J. Koebel.

Application for Patent filed January 12, 1932, Serial No. 586,238, a division of application No. 462,485 filed June 30, 1930. Base Metal Alloys.

Mr. Axel V. Beeken for applicant.

This is an appeal from the final rejection of claims 3, 4 and 7.

Claims 3 and 7 are illustrative and read as follows:—

3. As a new article of manufacture, a setting for diamonds composed of an alloy including molybdenum, approximately twenty-six percent, copper approximately twenty-seven percent and cobalt approximately forty-six percent.

7. As a new article of manufacture, a setting for diamonds consisting of a base metal alloy the principal ingredients of which are molybdenum, copper and cobalt (so proportioned as to be capable of being sintered at a temperature below that of the critical point at which the desirable qualities of the diamond are adversely affected) said alloy when so sintered having the property of wetting the diamonds coupled with a lack of avidity for the carbon thereof and, when thereafter cooled, of closely adhering to it.

The references relied upon are:—

Fahrenwald	1,346,190	July 13, 1920
Sattler	1,773,793	Aug. 26, 1930
British	331,414	July 3, 1930

63 The invention relates to a setting for diamonds. Applicant's object is to provide a setting which may be used on various types of cutting tools for securely retaining cutting diamonds thereon. The setting comprises an alloy composed mainly of molybdenum, copper and cobalt. In the specification, applicant gives two examples of the ingredients used. In the first example, the alloy contains Mo. 26%, Co. 45%, Cu. 27,75% and Iron 25%. In the second example, it contains Mo. 40%, Co. 20% and Cu. 40%. The molybdenum imparts hardness to the setting. Cobalt renders the alloy wettable with respect to the diamond. The copper prevents the alloy from robbing the diamond of carbon.

When the diamonds are to be set, they are embedded in a mass of the comminuted alloy, after which the alloy is subjected to high pressure to shape it. The shaped body is then heated in a furnace to 1245° C. out of contact with any oxygen and then cooled also out of contact with any oxygen.

The examiner has rejected all three of the claims because they are indefinite and broader than the invention. As to claims 3 and 4, he holds that the use of the word "approximately" therein renders them indefinite and broader than the invention disclosed. In the specification as originally filed it was stated that the examples given were for the purpose of illustration and not as a limitation. This indicates that applicant had in mind some variation of the proportions given in the examples. The term "approximately" has somewhat the same significance as the term "about" which is frequently used in defining proportions in an alloy. Each of these terms are used so that the
64 claim will not be limited to the exact percentage recited, but some slight variation may be made. We do not believe that this term "approximately" renders the claims indefinite, as obviously an applicant should be permitted some small latitude as to the proportions used. It is clear from the specification that applicant contemplates some variation and the claims are therefore not broader than the invention disclosed. We regard claims 3 and 4 patentable.

Claim 7 stands rejected as being indefinite and broader than the invention disclosed. The proportions of molybdenum, copper and cobalt are defined as follows:—

"... so proportioned as to be capable of being sintered at a temperature below that of the critical point at which the desirable qualities of the diamond are adversely affected, etc."

The examiner holds that the claim does not specify the proportions in such a definite way that the alloy can be made without resorting to experiment and therefore fails to clearly define the invention. We are in agreement with the holding of the examiner. Applicant by choosing the expression used is apparently seeking to define the proportions by the result obtained. Any one attempting to practice the invention as defined by this claim in its broadest aspect could not do so except by experimenting on different proportions to ascertain what proportions will give the desired result. Of course, the specific proportions given in the two examples in the specification can be used, but applicant apparently does not intend to limit the claim to these proportions nor immaterial variations of them.

We also regard the claim as being broader than the invention disclosed. Applicant has not set forth any adequate range of proportions that may be used to support a broad claim of this character. He has disclosed two examples and under them, would, taken together with the rest of the specification, be entitled to some latitude in varying the proportions in immaterial respects. This disclosure, however, does not warrant a claim for all ranges of proportions which will achieve the result sought. Other inventors may find that quite unexpected proportions will give the same result, and they should not be prevented from practicing any novel contribution made to the art.

The decision of the examiner is affirmed as to claim 7 and is reversed as to claims 3 and 4.

RICHARD SPENCER
First Assistant Commissioner

E. T. MORGAN
Examiner-in-Chief

H. EDINBURG
Examiner-in-Chief

BOARD OF APPEALS

November 23, 1935

66 District Court of the U. S. for the D. of C.

Case No. 61481 Date May 19, 1938

Exhibit No. In Evid. Plaintiff's 3

Filed May 23 1938

Tigerschiöld British Patent No. 331,414.

This patent is for a non-corrodible iron alloy and, as shown by the claims, molybdenum, copper and cobalt are not the principal ingredients.

It is not for a diamond setting, nor for a sintered product, and has none of the characteristics of applicant's claim 7.

PATENT SPECIFICATION

Application Date: Aug. 2, 1929. No. 23,825/29.

331,414

Complete Accepted: July 3, 1930.

COMPLETE SPECIFICATION.

Non-corrodible Alloys of Iron and Articles Produced therefrom.

I. Kjell Magnus Tigerschiöld, a Swedish subject, of Fagersta, Sweden, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to a new alloy of iron and articles thereof having a great resistance to acids (especially to sulphuric acid of various concentrations). Already known alloys of this kind contain 10—20% silicon with or without addition of copper, and have the great disadvantage of being very brittle whilst being difficult or even impossible of treatment with cutting tools. A very expensive alloy containing about 30% copper and 70% nickel has also been used for such purposes. Finally, when high durability is not necessary, lead has been used for the purpose in question. By this invention articles can be manufactured which have a high durability and great toughness, which at the same time may be easily treated with cutting tools, and which acquire great resistance to acids (especially to sulphuric acid of various concentrations). It is also known, that the generally employed austenitic nickel-steel containing about 20—35% nickel is more resistant to sulphuric acid than common iron. Even the austenitic alloys of chromium-nickel steel with up to 8% chromium and 7—35% nickel are relatively resistant to sulphuric acid.

With low percentages of carbon, austenitic alloys are obtained by addition of 25% nickel or more, and even with 20% nickel the alloy contains austenite in admixture with martensite. With a percentage of 8% chromium the alloy becomes slightly austenitic by an addition of 12% nickel. If the percentage of carbon is increased, the percentages of chromium and nickel may be decreased a little in order to reach the same effect. Additions of silicon or molybdenum, on the contrary, counteract the formation of austenite, whereas copper does not seem to have any great influence in this respect.

This invention is based on the discovery, that a simultaneous addition of silicon or molybdenum and copper to said austenitic steels greatly increases their resistance to corrosion by strong acids, especially by sulphuric acid of various concentrations.

The new technical effect aimed at is obtained thereby, that the articles in question, such as vessels, pipes, machine parts, valves etcetera, are manufactured from an austenitic or austenitic-martensitic alloy containing 15—30% nickel, 0—3% chromium, 2,5—10% silicon and 0,2—25% copper. In order to produce an alloy capable of being easily treated the percentage of carbon should be kept low (0.05—0.2%), but it may be increased up to 1,5% if a high wearing power is necessary. The nickel may be entirely or partially replaced by cobalt without the properties of the alloy being altered. It is desirable for certain acid concentrations to replace the silicon entirely or partially by molybdenum, which may occur in the alloy in percentages between 0,2—10% but is preferably present in such amounts that the total percentage of silicon and molybdenum exceeds 10%. Vanadium, titanium, tungsten or manganese may be present in small quantities without the qualities of the alloy being altered. The alloy may also contain the waste products occurring in common steel and iron.

It has been found that the best results are obtained if the alloy contains 20—30% Ni, 0—3% Cr, 2.5—7% (preferably 4—6%) Si and 0.5—25% (preferably 0.5—2.5%) Cu.

It may here be mentioned that an iron alloy has been proposed containing carbon, copper, tungsten or molybdenum, 5—30% chromium and 2—20% nickel, the chromium and nickel together amounting to 18—32% and small quantities of one or more of the following being added, if desired, namely, silicon, manganese, cobalt, vanadium, titanium and aluminium.

A carbon-free alloy suitable for the manufacture of wires and tapes for loading telephone conductors has also been proposed, comprising 58—65% Fe, 30—33% Ni and 2—6% Cu, with or without not more than 1% of Mn and a small quantity of one of the following,

[*Price* 1/-]

Cr, V, W, Mo, Si, Al and Ti.

These known alloys, however, differ in constitution from that forming the subject matter of this invention.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Non-corrodible austenitic or austenitic-martensitic alloy of iron with 15—30% nickel, 0—3% chromium and 0.05—1.5% carbon, characterised thereby, that it contains 2.5—10.0% silicon, and 0.2—25% copper.

2. Alloy of iron according to claim 1, wherein the amount of silicon does not exceed 7% and is preferably between 4 and 6% and the amount of copper is at least 0.5% being preferably between 0.5 and 2.5%.

3. Alloy of iron according to claim 1, wherein the silicon is entirely or partially replaced by molybdenum.

4. Alloy of iron according to claim 1, characterised by the fact that it also contains molybdenum in such a quantity that the total percentage of silicon and molybdenum exceeds 10%.

5. Alloy of iron according to claim 1, 2, 3 or 4 wherein the nickel is entirely or partially replaced by cobalt.

6. Articles such as vessels, pipes, machine parts, valves etcetera, which are to be subjected to the influence of corroding acids, such as sulphuric acid of various concentration when manufactured from an alloy according to claims 1, 2, 3, 4 or 5.

Dated this 2nd day of August, 1929.

WHEATLEY & MACKENZIE,
40, Chancery Lane, London, W.C. 2,
Agents.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1930.

68 District Court of the U. S. for the D. C.

Case No. 61481 Date May 19, 1938

Exhibit No. In Evid. Plaintiff's 4

Filed May 23 1938

Sattler Patent No. 1,773, 793.

This patent is for a permanent magnet made from a steel alloy in which 0.5% to 1.5% of molybdenum, 0.5% to 1% of copper, and 0.5% to 3% of cobalt are present in combination with iron. Adding the highest proportions of these metals (except iron) together, we have a total of 5.5% which certainly cannot be said to be the principal ingredients of a mass of 100%.

The patent is not for a setting for diamonds nor for a sintered product.

None of the characteristics recited in applicant's claim 7 are mentioned in the patent.

Patented Aug. 26, 1930 **1,773.793**

UNITED STATES PATENT OFFICE

CARL SATTLER, OF KREFELD, GERMANY, ASSIGNOR TO THE FIRM DEUTSCHE EDELSTAHLWERKE AKTIENGESELLSCHAFT, OF KREFELD, GERMANY

PERMANENT MAGNET

No Drawing. Application filed February 19, 1930, Serial No. 429,832, and in Germany March 8, 1929.

Up to now magnetic chromium and magnetic tungsten steels have been principally used for the production of permanent magnets. Since about ten years the magnetic cobalt steel has been added to satisfy greater demands. The latter, as a rule, being produced with a cobalt content of over 3%. In order to satisfy particularly great demands the cobalt content is being raised to 10, 15, 20 and 35%. Cobalt is still very expensive and the use of magnetic cobalt steel is still a very limited one. Since years the electro-technical industry is in search of a magnetic steel for use on a large scale which is not considerably more expensive than tungsten steel, yet surpasses the latter as regards the magnetic power. The present invention provides such a magnetic steel. This new magnetic steel is based upon the combination of steel alloys which, in addition to 1.3 to 6.5% of chromium as the basic alloying constituent, contain tungsten or molybdenum or vanadium or copper or cobalt or manganese or a mixture of two or more or all of these alloying metals. The presence of at least two of these alloying metals increases the coercive force of the magnetic steel. In order to prove this two alloys had been made one of which contained 0.61% C, 5.5% W, and 2.13% Cr in addition to 0.35% Mn. As a counter-proof a tungsten steel had been produced with 0.60% C, 5.8% W, and 0.33% Mn. In the former case the remanence was 10500 and the coercive force 68 gauss, whereas in the case of the tungsten steel test piece the remanence was 12000, the coercive force, however, only 60 gauss.

In carrying out a number of other tests in which in addition to chromium, tungsten or molybdenum or both were present, it has been found that the addition of one or both these metals increases the coercive force considerably as compared with the corresponding steel containing only chromium. If in addition to chromium and manganese tungsten alone is added, it will be necessary, with a chromium content of only 1.3 to about 1.9%, to add at least 0.8% of tungsten for the purpose of obtaining the highest magnetic efficiency. With a chromium content of 4.5% and more a smaller amount of tungsten may be added.

If in addition to chromium and manganese molybdenum alone is added, the molybdenum content has to amount to at least 0.8% with an upper limit of 1.5% in order to obtain a maximum magnetic efficiency. With these percentages, however, the remanence will be considerably lowered. Therefore, in order to secure the beneficial action of the molybdenum all the same, it will prove of advantage to use smaller amounts of molybdenum—about 0.3 to 0.6%—adding thereto tungsten or cobalt or copper either separately or in suitable combination. By properly regulating the proportions of tungsten and molybdenum relatively to the chromium content, one is enabled to produce, with a suitable carbon content which has to range from 0.65 to 1.25%, magnetic steels having a particularly high degree of remanence together with a perfectly satisfactory coercive force or, alternately, steels having a particularly high coercive force together with a satisfactory degree of remanence. If the coercive force rises above 80 gauss up to 100 gauss, the remanence will drop below 10000 gauss. Yet by suitably proportioning the content of carbon, chromium, tungsten and molybdenum, it becomes possible to raise the remanence to above 10000 gauss and the coercive force up to 80 gauss, i. e. to secure a magnetic power factor of Br. Hc. $10^{-3} \geqq 800$ (Gumlich's numbers), in contradistinction to the best tungsten steels which scarcely give better results than Br. Hc. $10^{-3} = 760$. An increase in the magnetic power factor is more easily brought about by the addition of cobalt in quantities already as small as up to 3%. A magnetic steel with about 3% of chromium and 2% of cobalt is, by way of example, not considerably more expensive than a 6% tungsten steel, yet by far its superior as regards the magnetic properties.

On the other hand, the manufacturing costs of a magnetic steel containing about 2% of chromium and 1% of tungsten or of a magnetic steel containing about 2% of chromium, 0.4% of molybdenum and 0.6% of tungsten are less by more than 20% than those of a 6% tungsten steel, yet its magnetic properties are equal to those of the best tungsten steel. Similar conditions will prevail if with a chromium content of 1.3 to 6.5% copper in amounts of about 0.5% is added in the place of tungsten or molybdenum. Also copper or vanadium or these metals together with tungsten and molybdenum and with cobalt may be added at the same time. All these metals will considerably increase the coercive force of a magnetic steel having a chromium content as alloying basis. Thus a test piece containing 4.75% Cr. and 1.57% Mo. had a coercive force of 79 gauss.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. Permanent magnets characterized by the fact that they are produced from steel alloys which contain 0.65% to 1.25% of carbon and about 0.25 to 1% of manganese and in addition to 1.3% to 6.5% of chrominum one of the following alloying constituents: tungsten (0.5 to 3%), molybdenm (0.5% to 1.5%), copper (0.5 to 1%) and cobalt (0.5 to 3%).

2. Permanent magnets characterized by the fact that they are produced from steel alloys which contain 0.65 to 1.25% of carbon and about 0.25 to 1% of manganese and in addition to 1.3% to 6.5% of chromium several of the following alloying constituents: tungsten (up to 3%), molybdenum (up to 1.5%), copper (up to 1%) and cobalt (up to 3%), the total percentage of said alloying constituents amounting to a minimum limit of 0.6 and a maximum limit of 7%.

3. Permanent magnets according to claim 1 in which the alloying metals tungsten, molybdenum, copper and cobalt are replaced at least partially by vanadium.

4. Permanent magnets according to claim 2 in which the alloying metals tunsten, molybdenum, copper and cobalt are replaced at least partially by vanadium.

CARL SATTLER.

70 District Court of the U. S. for the D. of C.

Case No. 61481 Date May 19, 1938

Exhibit No. In Evid. Plaintiff's 5

Filed May 23 1938

Fahrenwald Patent No. 1,346,190

This patent does not disclose a sintered product, a setting for diamonds, or a product having the characteristic recited in applicant's claim 7. It is a firearm barrel made of an alloy containing nickel in the proportion of 25 to 90 per cent and the balance copper. The fact is immaterial that a small proportion of one or more of the following may be added, chromium, molybdenum, tungsten, cobalt, vanadium, tantalum, zirconium, titanium, aluminum, iron, manganese, zinc, cadmium.

The alloy does not have as its principal ingredients molybdenum, copper and cobalt, so proportioned etc.

UNITED STATES PATENT OFFICE.

FRANK A. FAHRENWALD, OF CLEVELAND HEIGHTS, OHIO.

FIREARM AND ALLOY FOR MAKING SAME.

1,346,190. Specification of Letters Patent. Patented July 13, 1920.

No Drawing. Application filed December 15, 1919. Serial No. 345,081.

To all whom it may concern:

Be it known that I, FRANK A. FAHRENWALD, a citizen of the United States, residing at Cleveland Heights, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Firearms and Alloys for Making Same, of which the following is a full, clear, and exact description.

This invention relates to firearms and ordnance and has for its particular object the provision of a metallic alloy for use in the construction of the same which shall be more resistant to corrosion by the combustion products of the explosive as well as less corroded by atmospheric conditions and salt solutions (such as sea-water or perspiration) than any of the materials now in use for this purpose, as well as having sufficient mechanical strength to endure the strains to which such devices are subjected and at the same time being sufficiently soft and workable for manufacturing purposes.

Hitherto the universal substance for use in the manufacture of the barrels and working parts of firearms (including both hand-arms and fixed or heavy ordnance) has been a steel of some nature, consisting essentially of carbid of iron dissolved in an excess of iron, sometimes also including up to one or two per cent. of other metals such as nickel, tungsten, vanadium, etc. These materials offer the disadvantage of rapid corrosion by powder gases and residues, particularly those of smokeless powder, and rapid rusting as a result of atmospheric and salt conditions besides being subject to warping both during the course of manufacture and during the vicissitudes of operation. I have discovered that these disadvantages can be avoided by the employment of certain alloys containing a decreased amount of iron alloyed with a considerable amount of various protective metals of which the chief are nickel and chromium. In the case of chromium, nickel and iron are the only logical carriers, and the use of these metals for the purpose is fully set forth and claimed in my applications Serial No. 319,822, filed August 25, 1919, Serial No. 330,943, filed October 15, 1919, and Serial No. 345,083, filed December 15, 1919. In the case of the nickel, however, I have found that while iron is the best carrier (see applications Nos. 330,943 and 319,822, above mentioned) copper also may be used successfully. Alloys having between about forty per cent. and about sixty per cent. of nickel lie in the preferred range although any amount of nickel up to about ninety-nine per cent. can be employed with success. Alloys of the nickel-copper series containing less than about twenty-five per cent. of nickel are too soft and do not possess sufficient chemical resistance for severe requirements.

In case it be desired to increase the hardness and mechanical strength of this alloy, as it will be for some purposes, this can be done by the addition of any one or more of the following: chromium, molybdenum, tungsten, cobalt, vanadium, tantalum, zirconium, titanium, aluminum, iron, manganese, zinc, cadmium, all of which are soluble in one or the other of the primary ingredients, principally in the nickel. In this series of alloys nickel can properly be considered the basic element, since with a small nickel content not enough chromium molybdenum or other chemically resistant element can be caused to alloy with copper to result in a substance of sufficient non-corrodibility.

The amount of hardening metal permissible depends upon the amount of nickel present, since of the above hardening metals only aluminum, zinc and cadmium are soluble in copper to an appreciable extent. Besides the copper itself exerts a hardening effect on the nickel and when used in the larger proportions dispenses proportionally with any necessity for their use. Thus while the alloy containing the minimum of nickel above mentioned, namely 25%, is sufficiently strong for low power arms like .22 caliber rifles, the nickel content permits the addition of up to about 5% of chromium, molybdenum, tungsten, cobalt, vanadium, tantalum, zirconium, titanium, or iron; or manganese can be added up to about 10%; and owing to the copper content about 5% of aluminum could be added or somewhat larger amounts of zinc or cadmium; any of which additions serves to increase the hardness and tensile strength to a degree sufficient for practically any firearm requirement.

Within the preferred range of between 40% and 60% of nickel it is possible to increase the amounts of the nickel-soluble hardening ingredients in like proportion although the solubility of the copper-soluble constituents is correspondingly reduced. For practical purposes I recommend the use of one or more of the above named nickel-soluble hardness up to a maximum of about 20% of the nickel content, which maximum is rather high in the case of zirconium, titanium, vanadium, or tentalum, and can be considerably exceeded in the case of iron, chromium, or manganese. The desired hardness is most economically attained by the use of iron or manganese. The use of chromium would of course offer the additional advantage of increased chemical resistivity but as this is already sufficiently high I prefer the cheaper ingredient.

In any case it is necessary to use small amounts of dioxidizer or scavenger such as manganese, titanium, aluminum, magnesium, vanadium, or chromium, even though none of the same be desired in the resulting alloy, and of these I prefer manganese as being the cheapest.

Having thus described my invention, what I claim is:

1. A firearm barrel made of an alloy containing copper alloyed with not less than about twenty-five per cent. of nickel.

2. A firearm barrel made of an alloy containing copper alloyed with not less than about twenty five per cent. of nickel together with smaller amounts of one or more additional metals in or adjacent to the iron group in the periodic table.

3. A firearm barrel consisting of an alloy containing from about twenty-five per cent. to about ninety-nine per cent. of nickel and the balance principally of copper.

4. A firearm barrel made of an alloy consisting essentially of from about twenty-five per cent. to about ninety-nine per cent. of nickel, the balance being principally copper together with smaller amounts of one or more of metals, iron, manganese, chromium, molybdenum or tungsten.

5. A firearm barrel made of an alloy containing from about forty per cent. to about sixty per cent. of nickel together with about one per cent. to fifteen per cent. of iron, manganese, or chromium and the balance principally copper.

In testimony whereof I hereunto affix my signature.

FRANK A. FAHRENWALD.

72 District Court of the U. S. for the D. of C.

Case No. 61481 Date May 19, 1938

Exhibit No. In Evid. Plaintiff's 6

Filed May 23 1938

Bailey Patent No. 2,054,801.

Claim 1 of this patent was rejected by the Examiner but, on appeal, the Board of Appeals in the Patent Office said

> "The claims have also been rejected by the Examiner as not properly pointing out the invention in that they do not specify the particular proportions which are deemed essential. * * * it is believed that the present claims are sufficiently definite to point out the invention."

The date of this decision is March 31, 1936 which is subsequent to the decision of the Board in the instant case.

Patented Sept. 22, 1936 **2,054,801**

UNITED STATES PATENT OFFICE

2,054,801

GASKET PASTE

Charles W. Bailey, Dayton, Ohio, assignor, by mesne assignments, to Blue Rock Chemical Corporation of Virginia, a corporation of Virginia

No Drawing. Application July 10, 1929,
Serial No. 377,322

15 Claims. (Cl. 87—9)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to compositions suitable for use for sealing purposes, or as lubricants, and is particularly concerned with such compositions which may be used as sealing media with or without gaskets, or as lubricants for high speed bearings developing intense heat.

Among the objects and advantages of the present invention there may be noted the production of such compositions which are insoluble in ordinary materials with which they may come in contact under the conditions of usage specified above, such as gasoline, oil, water and steam, the resistance of such compositions to deterioration by high temperatures, and their substantial uniformity in consistency or viscosity under varying atmospheric conditions.

Other objects and advantages will appear from the more detailed description being set forth below, it being understood, however, that this more detailed description is given by way of illustration only, and not by way of limitation, since various changes may be made therein by those skilled in the art without departing from the scope and spirit of this invention.

In preparing compositions in accordance with the present invention, it has been found that castor oil exercises a very desirable characteristic for such purposes. The castor oil is desirably utilized with other materials, such as soap, to add body thereto, and diluents, such as glycerine, to maintain the character of the composition.

The castor oil is desirably utilized after being subjected to a heat treatment, such heat treatment in the preferred instance being at temperatures higher than those to which the composition will be subjected in actual use. In this manner, changes due to such high temperatures are avoided in the material after it has been compounded. A similar expedient may be utilized in connection with the other ingredients, that is the filler, bodiers and vehicles may, if desired, be subjected to heat treatments prior to their admixture and use for present purposes, whereby stability is obtained.

The following example illustrates a preferred composition made in accordance with the present invention, and it includes 40 per cent by weight of castor oil, 50 per cent by weight of soap and 10 per cent by weight of glycerine (commercial). For the preparation of this composition, a mixture of hot press and cold press castor oil are found highly desirable, the soap being soft soap gives body to the composition, while glycerine serves to give a more uniform or smooth product, and also tends to prevent segregation of the oil from the composition. Equal parts by weight of the cold press and hot press castor oil are mixed and heated together to a temperature at which the oil mixture begins to thicken and darken in color. A temperature of about 540° F. may be used for this purpose. If desired, the thickening process may be hastened by adding small quantities of water from time to time to the oil mixture during the heating step. The requisite quantity of soap is then heated to a temperature of about 180° F., such heating being continued until substantially all of the water contained in the soap is driven off. The oil mixture and soap having thus been prepared, they are combined desirably while at the temperatures of 540° and 180° respectively. The material should be thoroughly mixed together, but any type of mixing apparatus may be utilized. The "short" or crumbly appearance of the composition obtained by this procedure is avoided by the addition of the stated weight of glycerine, which desirably is first heated to about 200° F. prior to admixture with the oil and soap composition. The resulting composition is permitted to cool slightly, and is then packaged for sale.

As stated above, the glycerine may be omitted, although the composition is improved by its presence, and instead of glycerine other diluents may be utilized.

For example, the following gasket paste made of 50 per cent soft soap, 40 per cent lubricating castor oil, 7 per cent olive oil, and 3 per cent of filler such as Spanish whiting may be utilized. In the preparation of this composition, the soft soap may be boiled slowly with a portion of the castor oil at a temperature at about 150° F., preferably until all water is boiled out of the soap. The remainder of the castor oil is boiled at a temperature of approximately 500° until substantially all of the water is boiled out of the oil, three hours being sufficient for this purpose. The boiled oil is allowed to cool to approximately 300° F., and is then mixed with the soft soap composition. The olive oil and Spanish whiting are then added to form the final paste composition.

While castor oil is a preferred ingredient of the compositions, other oils having similar properties, such as quince oil, may be utilized.

The compositions produced in accordance with the present invention possess very desirable properties as gasket pastes, or as lubricants. They are insoluble in gasoline, oil, water and steam, and therefore prevent leaks where such materials are present. These compositions may, therefore, be used on gaskets, or metal to metal joints as at cylinder to crank case, and crank case sections, and joints of aviation machinery. The composition keeps the gasket in a soft and pliable condition, so that when the mechanism must be disassembled, such operation is readily conducted. When the compositions are blended at the higher temperatures specified, the usual temperature conditions met with an engine operation, or produced by friction do not affect such compositions. The pastes do not deteriorate, and maintain their consistency or viscosity under all unusual atmospheric conditions. In utilizing these compositions, the paste may be applied at the point desired, and since no setting time is required, the mechanism may be utilized immediately.

The pastes of the present invention have been used successfully on aviation engines and on paper mill machinery, as well as on automobile engines, gas engines of all types, steam engines or on any mechanism where gaskets burn out, or where paste is applied on metal to metal joints.

What I claim is:

1. A composition of the class described comprising heat-treated castor oil, soft soap and glycerine.

2. A composition of the class described comprising a mixture of heat-treated hot and cold press castor oil and soap.

3. A composition of the class described comprising a mixture of heat-treated hot and cold press castor oil, soft soap and glycerine.

4. A joint composition comprising heat-treated castor oil, soap and glycerine in proportions by weight of approximately 40, 50 and 10 respectively.

5. A joint composition comprising soft soap 50 parts, a mixture of heat-treated cold and hot press castor oil 40 parts, and glycerine 10 parts, the parts being by weight.

6. In a process of making a sealing composition, the steps of heating castor oil until it darkens in color, and mixing such heat-treated oil with soft soap.

7. The process of making a sealing composition which comprises heat treating castor oil, soft soap and glycerine and admixing the heat treated materials.

8. The process of making a sealing composition which consists in heat treating castor oil, saponaceous material and glycerine, and admixing the heat treated materials.

9. A composition of the class described comprising, castor oil that has been heat-treated at a temperature where it turns dark in color to materially increase its viscosity, a diluent of the class including glycerine and olive oil and a filler.

10. A composition of the class described comprising, castor oil that has been heat-treated at a temperature and for a period sufficient to darken its color and to materially increase its viscosity and a soap.

11. A composition of the class described comprising castor oil that has been heat-treated at a temperature and for a period sufficient to cause it to darken in color and materially increase its viscosity and a diluent of the class including glycerine and olive oil.

12. A composition of the class described comprising castor oil that has been heat-treated at a temperature and for a period sufficient to cause it to darken in color and materially increase its viscosity and glycerine in sufficient amounts to maintain the character of the composition.

13. The process of making a sealing composition which consists in heat-treating castor oil to the point of dehydration to thereby obtain a change in color and a material increase in viscosity, in heat-treating a soap to the point of dehydration and admixing the heat-treated materials.

14. A composition of the class described comprising castor oil that has been heat-treated at a temperature and for a period sufficient to cause it to darken in color and materially increase its viscosity and a diluent of the class including glycerine at least about 10% by weight.

15. A sealing composition containing a gasoline immiscible, heat bodied castor oil, and a mineral filler in proportions to yield a gasket paste, the amount of bodied castor oil substantially exceeding the amount of mineral filler.

CHARLES W. BAILEY.

CERTIFICATE OF CORRECTION.

tent No. 2,054,801. September 22, 1

CHARLES W. BAILEY.

It is hereby certified that the above numbered patent was erroneously iss
o "Blue Rock Chemical Corporation of Virginia", as assignee by mesne assig
ents, whereas said patent should have been issued to the inventor, said Ba
s shown by the records of assignments in this office; and that the said Le
atent should be read with this correction therein that the same may confor
he record of the case in the Patent Office.

Signed and sealed this 23rd day of March, A. D. 1937.

Henry Van Arsdale
Acting Commissioner of Patents.

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2,054,801 - 2,055,000.

CERTIFICATE OF CORRECTION.

Patent No. 2,054,801. September 22, 1936.

CHARLES W. BAILEY.

It is hereby certified that the above numbered patent was erroneously issued to "Blue Rock Chemical Corporation of Virginia", as assignee by mesne assignments, whereas said patent should have been issued to the inventor, said Bailey, as shown by the records of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23rd day of March, A. D. 1937.

Henry Van Arsdale
(Seal) Acting Commissioner of Patents.

CERTIFICATE OF CORRECTION.

Patent No. 2,054,801. September 22, 1936.

CHARLES W. BAILEY.

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Signed and sealed this 23rd day of March, A. D. 1937.

Henry Van Arsdale
(Seal) Acting Commissioner of Patents.

75 District Court of the U. S. for the D. of C.

Case No. 61481 Date 5-19-38

Exhibit No. In Evid. Plaintiff's 7

See claims 1 and 2.

Filed May 23 1938

Patented Dec. 18, 1928. **1,695,845**

UNITED STATES PATENT OFFICE.

GEORGE W. HALLOCK, OF BLOOMFIELD, NEW JERSEY, ASSIGNOR TO WESTINGHOUSE LAMP COMPANY, A CORPORATION OF PENNSYLVANIA.

ALLOY BASE FOR OXIDE-COATED CATHODES.

No Drawing. Application filed October 27, 1927. Serial No. 229,276.

This invention relates to electron-emitting cathodes of the oxide coated type, such as are used in thermionic discharge devices, and more particularly to an electrically conductive core or base for such cathodes.

Heretofore in the manufacture of oxide coated cathodes it has been the usual practice to employ a core of nickel or platinum-iridium alloy. Nickel has very largely superseded the use of platinum-iridium, due to the excessive expense of the platinum. Nickel has the disadvantage, however, in that its specific resistance is such that the voltage-ampere characteristics required for the large size filaments cannot be readily obtained without reducing the thickness of the core to such an extent that it is mechanically weak or, if proportioned for proper tensile strength, causing it to operate at an excessively high temperature, either of which result in short life.

For instance, with large sizes of ribbon, in order to obtain the required voltage and amperage characteristics, and the requisite surface area to maintain the proper operating temperature, it is necessary to roll the core into a ribbon of considerable width and of an extreme thinness, below 1 mil. Great difficulty is involved in uniformly rolling the material to this degree of thinness and the edges become frayed and feathered so that the ribbon is easily torn and does not have sufficient strength to withstand the strain required to maintain it taut on the mount. The ribbon is, therefore, made thicker and narrower than theoretically required in order to increase the tensile strength but due to the decrease in heat radiating surface thus occasioned, the cathode operates at an excessively high temperature. This high filament temperature results in bombardment of the cathode by back emission from the grid or plate, caused by the thermionically active coating on the cathode being thrown off at the high operating temperature thereof and depositing on the grid, and the heating of the grid, to an electron emitting temperature by heat radiated from the overly heated cathode. This back bombardment rapidly destroys the filament.

Difficulty has also been experienced in the smaller size filaments when employing nickel cores, in causing the oxide coating to adhere, since in order to obtain the required voltage-amperage characteristics, it is necessary to go to the other extreme, and make the ribbon narrow and thick, rather than broad and thin. The oxide coating does not adhere as readily to the narrow ribbon as it does to the broader surface.

The hot strength of nickel is low, moreover, which contributes materially to the failures due to breakage of both the smaller sized and the extremely thin nickel ribbons.

One of the objects of the present invention is to overcome the above mentioned difficulties and to produce a metal core for an oxide coated cathode which will have the proper specific resistance to enable the required voltage-amperage characteristics to be readily obtained at the proper operating temperature and which will be strong and rugged.

A further object is to provide an electrically conductive core which will have a high tensile strength while hot.

A still further object is to provide a thermionically active cathode which will have a large electron-emitting surface area for a given voltage and current requiement.

Other objects and advantages will hereinafter appear.

In accordance with my invention, I employ as the electrically conductive core an alloy of nickel with another metal which will alter its specific resistance so as to enable the proper physical and electrical characteristics to be obtained. For the large size filament, I employ an alloy having a higher specific resistance than pure nckel, whereas, for the smaller size filaments, I employ an alloy having a lower specific resistance than nickel.

Thus, for instance, in producing cores for cathodes of large size, that is, having a filament weight corresponding to an 8 mil wire, in order to meet the voltage and amperage requirements which have become standardized in the radio industry and maintain proper operating temperature of the filament, it would be necessary to flatten an 8 mil nickel wire to a width of about 40 mil and a thickness of less than 1 mil. This is not practical, however, due to the low tensile strength of nickel, and the extreme fragility of a ribbon of this thinness. I have found, however, that certain alloys, such as an alloy of silicon and nickel or manganese and nickel in the proper proportions have a higher specific resistance than pure nickel and, therefore, that it is possible to employ a thicker ribbon of substantially the same width and which will, therefore, have increased tensile strength in proportion to the increase in size. Silicon-nickel and manganese-nickel have greater hot strength than pure nickel moreover so that the strength of the filament is still further increased.

For the large size wires, silicon-nickel is preferred since its change in specific resistance for various percentages is very slight. An alloy containing about 3% of silicon I have found very satisfactory, but the percentage may run from 2 to 6% without materially altering the electrical conductivity of the metal. This is advantageous since it eliminates the necessity of maintaining exact proportions in the fabrication of the wire. Manganese nickel with a manganese content of 4% is also satisfactory for large filaments, but the proper percentage of manganese must be more carefully maintained, since the conductivity varies considerably with the change in manganese content.

Pure nickel ribbon of a weight corresponding to a 6 or 8 mil wire has a specific resistance of about 5.35 ohms per sq. cm., whereas, the alloys which I prefer for filaments of this weight have a specific resistance of about 6.

For small size wires, it is desirable that the specific resistance of the metal core be lower than that afforded by pure nickel in order to meet the standard requirements. In the case of pure nickel, as the weight of the filament is decreased, for use in tubes of smaller output, the thickness of the filamentary core increases and the width decreases so that for the smallest size filaments the thickness approaches the width. When these conditions are obtained, difficulty is experienced in causing the oxide coating to properly adhere to the small flat surface presented by the narrow ribbon. In such case, I have found that an alloy such as an alloy of manganese and nickel containing about 2% of manganese, which has a lower specific resistance than nickel, may be shaped into a relatively broad and thin ribbon while maintaining the required voltage and amperage conditions and the proper operating temperature. This broad ribbon presents a more extensive surface to which the oxide coating will adhere more tenaciously. It also increases the electron emitting area of the cathode and thereby enhances the electron emitting property of the coated cathode. In these small size wires the increased tensile strength afforded by the alloy core increases very materially the life of the device in which it is employed.

I have further found that the silicon or manganese-nickel alloy cores are not as susceptible to variations in their specific resistances by internal changes in the core as is nickel. In the case of pure nickel, the conductivity varies according to the particular heat treatment and mechanical working to which it is subjected.

It is the practice in the manufacture of electron discharge devices employing oxide coated cathodes to subject the filament in the completely assembled tube during the exhaust treatment to a high temperature flash while the other electrodes are being degasified in order to prevent absorption by the cathode of gas liberated from the other electrodes. This high temperature flash is much in excess of the normal operating temperature of the cathode and changes the electrical conductivity of the wire, probably due to a change in the internal construction of the metal core. Therefore, in designing nickel cores for oxide coated cathodes, it is necessary to take into consideration the change in conductivity effected by this high temperature treatment. Since this treatment is not uniform in all tubes, the electrical conductivity of filament cores of the same size is not uniform and this non-uniformity has caused considerable difficulty.

In the case of silicon-nickel or manganese-nickel alloy, I have found that this high temperature treatment does not materially vary the electrical conductivity and much greater uniformity in the electrical characteristics of the cathodes is obtained and the design of the core considerably simplified.

One of the difficulties, which has been mentioned before, when employing large oxide coated cathodes with nickel cores has been the high temperature at which the cathodes necessarily operate by virtue of the fact that they must be made thicker and narrower than they should be theoretically, in order to impart the necessary mechanical strength thereto. The proper operating temperature, particularly in tubes having a large power output, must be carefully observed, since if the temperature is too high the oxide coating sputters or otherwise becomes transferred over to the other electrodes. These other electrodes become highly heated by radiation from the cathode so that they themselves become thermionically active and the electrons emitted therefrom bombard the filament and rapidly disintegrate the same so that it quickly burns out. Due to the greater specific resistance of silicon-nickel or manganese-nickel when employed as a core for filament of large size, the heat radiating area is increased for the same voltage and current conditions and consequently the filament operates at a lower temperature, whereby the difficulties due to back emission are eliminated.

It should be understood that while silicon and manganese have been specified as the particular alloying ingredients in definite proportions, that the invention is not limited to these specific details, but equivalent metals may be employed and other proportions, depending upon the particular conditions which it is necessary to attain.

What is claimed is:

1. An electrically conductive core for a thermionically active cathode comprising an alloy of nickel and silicon.

2. An electron-emitting cathode comprising an alloy of nickel and silicon and a coating thereon of thermionically active material.

3. A metal core for an electron-emitting cathode of the oxide coated type composed of an alloy of nickel and about 3% of silicon.

4. An electron-emitting cathode comprising a core composed of an alloy of a metal of the group containing nickel and up to 6% of silicon.

In testimony whereof, I have hereunto subscribed my name this 26th day of October, 1927.

GEORGE W. HALLOCK.

78 Claim 1 sustained by Circuit Court of Appeals (8th Cir.) in Wisconsin Alumni Research Foundation vs. Breou & Co. Decision August 5, 1936 (85 F(2) 166-172).

District Court of the U. S. for the D. of C.

Case No. 61481 Date May 19, 1938

Exhibit No. In Evid. Plaintiff's 8

Filed May 23 1938

Patented Sept. 13, 1932 **1,877,237**

UNITED STATES PATENT OFFICE

EDWIN B. HART, OF MADISON, WISCONSIN, ASSIGNOR TO WISCONSIN ALUMNI RESEARCH FOUNDATION, OF MADISON, WISCONSIN, A CORPORATION OF WISCONSIN

COMPOUND FOR THE PREVENTION AND TREATMENT OF ANEMIA

No Drawing. Application filed June 18, 1928. Serial No. 286,497.

This invenion relates to a compound for the prevention and treatment of anemia.

Anemia in one form is a disease of human infants and adults, and of young animals which is likely to develop from living solely on a milk diet over too long a period. It is also a disease of mature animal life. It is characterized by a deterioration of the blood stream with respect to its content of hemoglobin and the number of red blood cells. As the disease develops the respiration becomes rapid, the heart enlarged, the pleural cavity edematous, and death follows, unless remedies are provided.

The invention is broadly directed and has for its object the specific prevention or beneficial treatment or corrective of anemia however induced, and contemplates the use of a therapeutic agent containing as an active ingredient salts of the elements copper and iron, which may be administered either together or in conjunction with other substances hereinafter referred to, by direct feeding to the patient or through the addition of the salts of copper and iron to the diet, whereby the hemoglobin content of the blood and the number of red blood cells are beneficially affected and anemia corrected or prevented.

The invention further contempates the provision of a therapeutic agent containing salts of both the elements copper and iron, administered as above referred to, and wherein the salts of the elements copper and iron appear to be made available in the blood stream of the patient for the purpose of increasing the hemoglobin content of the blood and the number of red blood cells. In particular, the invention relates to the use of simple salts of iron, such for instance as iron chloride, and inorganic salts of copper, such for instance as copper sulphate. However, other salts of the elements mentioned may be employed, such as copper acetate, copper chloride, or any other convenient salt, and even metallic copper has been used. The iron is equally necessary, and it is the presence of the copper which makes the iron effective in hemoglobin building. Consequently, both iron and copper must be present, and in making effective anemia-preventing food mixtures, both iron salts and copper salts (or metallic copper) are to be added. The iron also can be used as a sulphate, a citrate, or a phosphate, or other salt iron, and it has even been found that in some cases the mere use of commercial inorganic iron salts may be effective in the treatment of anemia in virtue of their content of copper as a contaminant, although commercial iron salts in which copper is not present are not effective.

Further, the invention contemplates a therapeutic agent for the treatment of anemia wherein the salts of the element copper are adminstered to patients, in combination with the salts of iron, and wherein the salts of the elements copper and iron are made available from the ash of dry plant tissue, such as lettuce, cabbage, alfalfa, and the stem and leafy parts of other plants; from the seeds of plants, as for example, corn grain; or from animal tissue, such as liver, spleen, bone marrow, egg yolk, and other animal tissue.

Further, the invention contemplates a therapeutic agent of the character referred whereby inorganic substances such as salts of the elements copper and iron, either singly or in combination, are made available for assimilation or beneficient co-action with reference to the blood stream of the patient, when the substance is directly fed to the patient or added to the diet, and wherein the salt of the element copper is procured by burning such plant and animal tissues as above mentioned, and removing the carbon therefrom, leaving an ash residue containing salts of the element copper, and of iron, and possibly other substances not yet identified.

The invention further contemplates administering to a patient an ash prepared from plant or animal tissue as before referred to, either by direct feeding or addition to the diet of the patient, which ash has been rid of carbon and contains salts of copper, and of iron.

In carrying out the invention, dried plant tissue, such as lettuce, cabbage, alfalfa, or the stem and leafy parts of other plants, and the seeds of certain plants, as for example, corn grain; or animal tissue such as liver, spleen, bone marrow, egg yolk, and other tissues, are treated as follows:—First, the ash of the plant and animal tissue may be prepared by incinerating the material at a temperature that destroys the carbon of the plant or animal tissue. The temperature at which this ash should be prepared from vegetable or animal tissue is what is called a low cherry red, that is, a temperature of from 550° to 650° C., or thereabouts. After the ash is prepared, it may, if desired, be used directly as an addition to the diet, but if further treatment is desired in order to secure the active constituents, a suitable solvent may be employed, as for instance a forty percent (40%) solution of hydrochloric acid, which acid is added to the ash and the mixture digested at from 60° to 70° C., and then filtered through filter paper. The filtrate contains the active substances, which consist of small portions of salts of the elements copper and iron, and the hydrochloric acid of the solution is removed by evaporation and heating to dryness. After evaporation of the hydrochloric acid the residue is suitable for feeding or can be dissolved in water and used.

An ash of the character referred to has been utilized in connection with the correction and prevention of anemia with surprising results. For instance, the ash of 1 gm. of dried lettuce per day, added to whole milk, utilized as the only other source of food, maintained the blood stream of a 200 gm. rat at a normal level with respect to hemoglobin and blood count for an indefinite period. Without the ash the disease of anemia would set in, with deterioration of the blood stream, followed by death.

Salts of the element iron have long been considered by physicians and chemists to be useful in the treatment of anemia, and it was known that a certain proportion of iron was present in the residue ash, after burning the plant and animal tissues above referred to. One would assume that the administration of the ash to a patient merely supplied him with the necessary iron to combat an anemic condition. However, extensive experiments showed that the administration of pure inorganic iron in any form to an anemic patient, failed to serve in augmenting the depleted hemoglobin content and number of red blood cells of the blood stream. This unexpected result led to further examination of the ash of liver and lettuce, for instance, as well as the ash of the other materials heretofore referred to, which in each instance disclosed that the ash possessed a pale bluish color similar in hue to that produced by copper compounds when burned. Assuming the presence of copper salts in the ash, and considering the efficacy of the ash in counteracting the anemic condition, copper compounds, such as copper sulphate were administered to the anemic animals through direct feeding or additions to the diet. Surprising cures were effected. Rats suffering with advanced attacks of anemia and with their hemoglobin reduced more than 75%, were restored to normal by daily additions to their milk diet of various quantities of copper in the form of pure copper sulphate.

Subsequent experiments were conducted wherein the salts of copper and iron were administered together, which experiments again demonstrated the active properties of the agent in correcting and preventing anemia. As above stated, iron salts alone appeared to have no effect in checking or preventing the disease, though it is believed that possibly the iron is made available in its effect on the blood stream, in some way not yet determined when administered in conjunction with salts of copper.

Further experiments showed that salts of copper in conjunction with plant and animal tissues heretofore used in connection with the treatment of anemia produced marked and beneficial changes in the blood steam; also salts of copper in addition to the ash of plant and animal tissue, as above referred to, produced marked beneficial effects; and the same was found to be true of combinations of salts of copper and extracts of plant and animal tissues, such as lettuce, corn and dried liver. Also the presence of salts of copper and iron in conjunction with the plant and animal tissues, or the ash of plant and animal tissues, or extracts thereof, also produced marked beneficial results in the treatment of anemia.

In each instance, the therapeutic agent or compound was fed directly to animals or added to the diet of the same, and the experiments conclusively demonstrated that administration of inorganic substances, particularly salts of copper, in conjunction with salts of iron, or as additions to plant or animal tissue containing salts of iron, or the extracts of such plant or animal tissue, or the ash of such plant or animal tissue, or the ash of extracts of such plant or animal tissue, is decidedly efficacious in increasing the hemoglobin content of blood as well as the number of red blood cells, when anemia is present, and further prevents a reduction of the hemoglobin content or number of red blood cells such as would produce anemia without the use of the therapeutic agent in one of its various forms.

The process of administering the agent in its various forms by introduction into the stomach indicates a chemical reaction with the blood of the animal whereby the therapeutic agent in its various forms is made available for the purpose of materially increasing the hemoglobin content of the blood and the number of red cells thereof, resulting in the positive correction and prevention of anemia by improving the condition of the blood stream and maintaining it in such condition as to eliminate the known causes which produce anemia. In order to point out more in detail the precise manner in which the material may be prepared, and without limiting myself to the particular details hereinafter set forth, the following is given as an example of a technique which may be successfully employed:

The dried plant material such as lettuce, cabbage, alfalfa, etc.; or the stem and leafy parts of other plants; or seeds of plants such as corn, grain; or animal tissue such as liver, spleen, bone marrow, egg yolk, and other animal tissues, is placed in a porcelain dish, and this dish with its contents then placed in a suitable furnace either gas or electric heated, or fired in any other suitable way, and subjected to an ashing temperature of 550 to 650° C. for a time sufficient to completely char this mass and burn off the carbon. This may require one or two hours, and leaves a gray ash which can be then used as a supplement to the diet or ration as sources of iron and copper. One or two grams of such ash daily becomes a corrective for anemia induced by milk diets. Larger amounts would be used where the adult is involved in some type of secondary anemia.

Further work discloses that the constituents of the ash that are active in preventing the anemia are iron and copper salts. These are best used in the form of iron chloride and copper sulfate. A proportion of iron chloride contributing 25 mgs. of iron daily and a proportion of copper sulfate contributing 4 mgs. of copper daily is the daily dosage for an adult; for an infant, the same amount of iron but an amount of copper sulfate contributing 1 mg. of copper daily. These two salts, iron chloride and copper sulfate, can be mixed directly by trituration in a mortar and then compounded with some inert material like milk powder or corn starch to insure palatability; or they can be dissolved in water and then mixed with some sugar syrup to make them more palatable.

While I have herein shown and described what I consider the preferred manner of carrying out the invention, the same is merely illustrative, and I contemplate all changes and modifications which come within the scope of the claims appended hereto.

What I claim is:

1. A therapeutic agent for use in connection with the treatment of anemia, including copper sulphate and a salt of iron combined to render effective the utilization of said salts for correcting the anemic condition of the blood.

2. A therapeutic agent for use in connection with the treatment of anemia, in the form of an ash derived from organic material containing salts of iron and copper combined to activate hemoglobin regeneration of the blood.

3. A therapeutic agent for use in connection with the treatment of anemia, in the form of an ash derived from organic material containing a salt of iron and copper sulphate combined to activate the hemoglobin regeneration of the blood.

4. A therapeutic agent for the treatment of anemia containing salts of the elements of iron and copper combined to render effective the utilization of the iron to correct the anemic condition of the blood.

5. A therapeutic agent for the treatment of anemia containing salts of the elements of iron and copper combined to render effective the utilization of said salts to correct the anemic condition of the blood.

6. A therapeutic agent for the treatment of anemia containing salts of the elements of iron and copper combined to render effective the utilization of said salts for increasing the hemoglobin content of the blood.

In witness that I claim the foregoing I have hereunto subscribed my name this 12th day of June, 1928.

E. B. HART.

81 District Court of the U. S. for the D. of C.

Case No. 61481 Date May 19, 1938

Exhibit No. In Evid. Plaintiff's 9

Filed May 23 1938

Black Patent No. 2,075,164

See Gasoline Products Co. v. Coe 87 F (2) 550 Decision Ct of Appeals D. C. Decision dated Dec. 7, 1936. Claims 1 and 2 of patent were claims 13 and 14 of decision.

Note in claim 1

''said chromium in the alloy being in such proportions as to substantially prevent', etc.

Note in claim 2

''an iron chromium nickel alloy, said alloy being in such constituent proportions as to substantially prevent'', etc.

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PATENTED DRAWING
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March 30, 1937. J. C. BLACK 2,075,164

METHOD AND APPARATUS FOR CONVERTING HYDROCARBONS

Original Filed Nov. 6, 1922

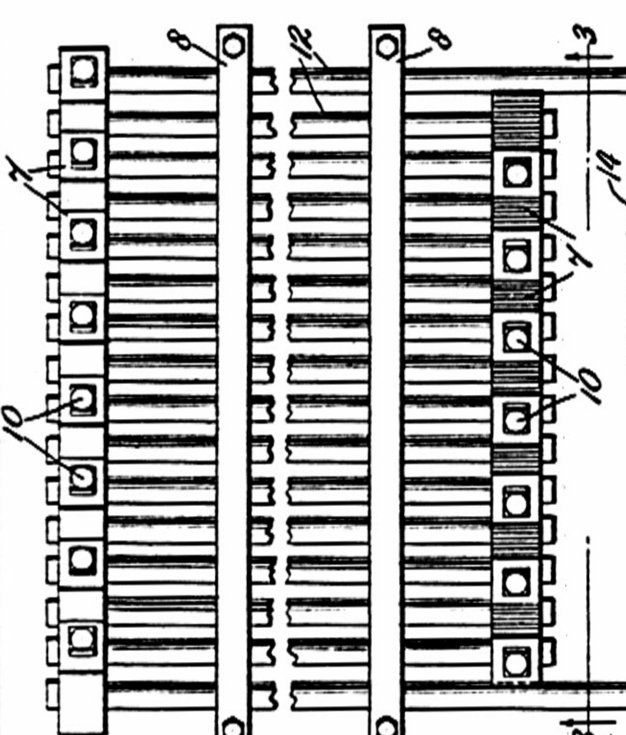


Fig.2.

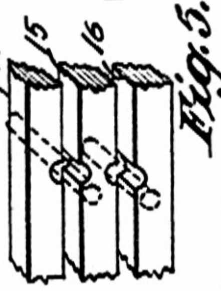


Fig.5.

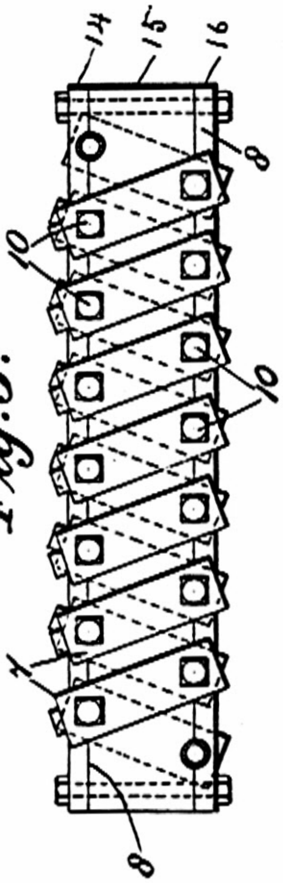


Fig.3.

Fig.1.

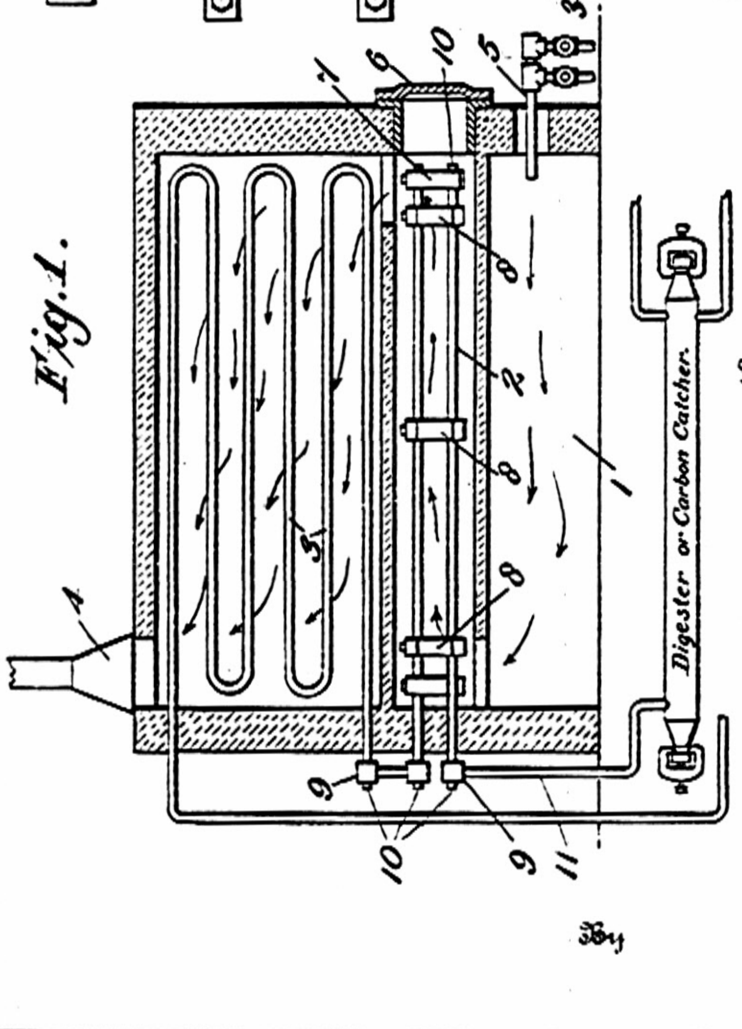
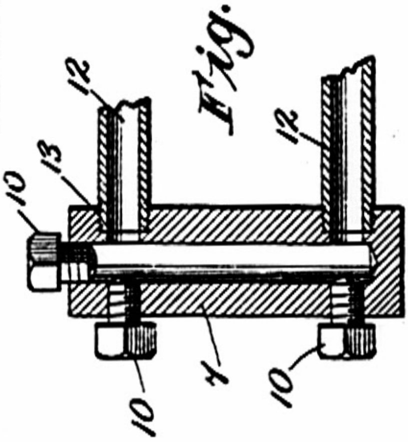


Fig.4.



Inventor
John C. Black
by J. G. Newton

By

Attorney

2 1937

JUN - 9 1937

Patented Mar. 30, 1937 **2,075,164**

UNITED STATES PATENT OFFICE

2,075,164

METHOD AND APPARATUS FOR CONVERTING HYDROCARBONS

John C. Black, Los Angeles, Calif., assignor, by mesne assignments, to Gasoline Products Company, Inc., Wilmington, Del., a corporation of Delaware

Application November 6, 1922, Serial No. 599,403

10 Claims. (Cl. 196—110)

This invention relates to the art of producing low boiling point hydrocarbons from those of high boiling point hydrocarbons and more particularly by the process described in my Patent No. 1,426,813 in which the hydrocarbons are heated in a coil and maintained while being heated at a pressure sufficient to prevent vaporization of the hydrocarbons, and this application for Letters Patent refers particularly to the method of operating and constructing the heating coil in the before mentioned Patent No. 1,426,813.

In the before mentioned patent I describe a process wherein I employ temperatures as high as 1000° F. and pressures as high as 1000 pounds or more per square inch. To withstand these excessive temperatures and pressures, it is essential to construct the heating elements or coils in a very substantial and safe manner, and furthermore, it is advantageous to so construct the coil that each pipe or tube can be easily opened for inspection and cleaning without dismantling it. It is also advantageous to be able to construct the coils outside of the furnace and insert them in the furnace as a complete coil only requiring connection to the balance of the apparatus to make it operative.

I have discovered that the presence of sulphur in the hydrocarbons, either as free sulphur or as sulphur compounds, will readily attack the steel of the tubes when the coil is in operation under the high pressure and high heat employed in the process. To overcome this difficulty, I prefer to use an alloy steel such as nickel steel or chrome nickel steel, or I may use a tube which has been heat-treated with aluminum wherein a thin coating of aluminum iron or aluminum steel alloy is produced which acts as a protective surface to the tube and prevents to a great extent the destructive action of the sulphur or sulphur compounds.

To withstand the high pressure employed in the process and especially so under the high heat employed, I prefer to use a seamless drawn tube in preference to a pipe made by welding, such as the ordinary butt or lap-welded pipe of commerce, as I have found that such pipe will not stand the strains as well as the seamless tubing. However, I do not wish to limit myself in the construction of my coils, as either seamless or welded seam pipe may be employed.

Referring to the drawing:

Figure 1 is a sectional elevation of the coil placed in the furnace.

Figure 2 is a plan view of the coil.

Figure 3 is an end elevation on the line 3—3 of Figure 2.

Figure 4 is a sectional view of the return connectors and clean-out blocks.

Fig. 5 is a sectional view of the coil clamps.

Like numbers refer to like parts in the various figures.

The furnace **1** is of brick construction and may have one or more compartments. In the drawing, **1** is shown as a furnace with three compartments, one for combustion space, one for the main coil **2** and one for the economizer coil **3**. The furnace is fitted with a stack **4** to carry off the products of combustion; **5** is an oil or gas burner of the ordinary type; **6** is a door to afford access to the coil **2**; **7** are the blocks which form the crossovers from tube to tube and **8** are clamps to hold the coil together; **9** are angle blocks for making connections one part with the other; **10** are plugs in the angle blocks and coil blocks to afford means for inspection and cleaning the tubes; **11** is a connecting tube from the outlet of the coil to the digester or carbon catcher described in my Patent No. 1,426,813; **12** are the tubes shown in Figures 2 and 4; **13** the threaded connection of the tube and block; **14**, **15** and **16** are the three sections that go to make up the clamp **8** shown in Figure 3. These three sections are shown in cross section in Figure 5, the clamped tubes **12** being indicated in dotted lines.

It will be noted in Figure 1 that the coil 2 is located entirely within the heating zone of the furnace with only the ingress and egress connections out of the heating zone—this I have found desirable and in some cases necessary to prevent the corrosive action of the sulphur or sulphur compounds in the hydrocarbons being cracked, as I have found by experience that there is a thin coating of carbon deposited upon the inside of the tubes which acts as a protective coating thereon and the sulphur present in the hydrocarbons will not attack the steel either in the tubes or the return connectors. This protective carbon or carbonaceous deposit is only formed in the tubes or return connectors when they are inside the heating zone of the furnace and is due, I believe, to the baking action of the high heat found in the heating zone and to which the coil is subjected. This is a very important feature of my cracking coil, as it adds very materially to the life of the coil. It also has the added feature of the entire coil acting as a heat absorbing element, no portion of which is outside the heating zone.

The coil as constructed consists of a plurality of tubes arranged in layers, each tube in one layer being connected to a tube in another layer by means of steel blocks bored through in line with the tubes, one side being counterbored and threaded to receive the threaded end of the tube and the other end of the bored hole is threaded to receive removable threaded plugs which act as closures when the coil is in operation, or when removed will afford means for inspecting and cleaning the tubes. Lengthwise with the blocks is a bore hole, preferably the size of the inside diameter of the tubes, and in communicating with the two previously described bore holes, the axis of the longitudinal bore holes intersects the axes of the two transverse bore holes; the upper end of the longitudinal bore hole is threaded to receive a threaded plug which has the same function as the two previously described plugs.

The longitudinal bore hole is not bored beyond the point where it makes full communication with the second tube opening, although it could be drilled through and threaded the same as the other end, but nothing would be gained by this and expense would be incurred.

In place of threading or screwing the tubes into the blocks, they may be welded in, the blocks then being only counterbored to receive the tubes and not threaded.

To hold the coils as a unit, I employ a three piece cast iron or steel clamp, usually three in number to each coil, one near each end and one in the middle; the middle portion of the clamp is grooved out with semi-circular grooves to receive the tubing and so spaced as to give the proper spacing of the tubes; the upper and lower portions of the clamp are also grooved out in a similar manner to the middle portion and have extended ends through which pass bolts to fasten the top, bottom and middle sections together, thus securely fastening the various tubes into a single rigid unit.

I prefer to construct the coil in a symmetrical manner as to spacing of the tubes, that is to say any lower tube is equidistant from the two tubes immediately above it, and vice versa, any upper tube is equidistant from the two tubes immediately below it.

Furthermore, the blocks at one end of the coil are inclined uniformly in one direction or the other and at the opposite end of the coil in the reverse direction. By this expedient, tubes placed parallel with the longitudinal axis of the coil will connect opposite blocks, and when all the blocks are so connected, the structure so assembled will form a continuous coil of a single passage with two open ends, one for inlet and the other for outlet connection. This is all clearly shown in the drawing—Figures 2, 3 and 4.

The blocks may be placed vertically instead of inclined, but if this is done, the tubes will not be parallel with the axis of the coil and it might be difficult to insert a cleaning tool into the tube, as it would be sprung out of line a distance equal to the spacing between tube centers. For this reason, I prefer the first described method of construction, but I do not wish to be limited to that type, as the last mentioned construction will be operative.

What I claim as new is:

1. In an apparatus for cracking petroleum oils for the production of lower boiling hydrocarbon oils, a metallic cracking coil substantially resistant to the action of sulphur, said metallic coil being composed of an iron and chromium alloy, said chromium in the alloy being in such proportions as to substantially prevent the corrosive action of sulphur.

2. In an apparatus for cracking petroleum oils for the production of lower boiling hydrocarbon oils, a metallic cracking coil substantially resistant to the action of sulphur, said metallic coil being composed of an iron chromium nickel alloy, said alloy being in such constituent proportions as to substantially prevent the corrosive action of sulphur.

3. An apparatus for cracking hydrocarbons comprising a furnace, a cracking coil positioned within said furnace, said coil being formed of material comprising an alloy of iron and chromium substantially resistant to the corrosive action of sulphur and means in said furnace for supplying products of combustion thereto.

4. An apparatus for cracking hydrocarbons comprising a furnace, a plurality of tubes in said furnace through which the oil to be cracked is passed under pressure, said tubes being formed of an alloy of iron chromium and nickel, substantially resistant to the action of sulphur under the conditions of cracking, and means for passing hot products of combustion over said tubes to crack the oil therein.

5. In the art of converting higher boiling hydrocarbon oil into lower boiling hydrocarbon oil, the improvement which comprises heating said oil to a cracking temperature in a metallic coil composed of an alloy of chromium and iron, said coil being substantially resistant to the action of sulphur.

6. In the art of converting higher boiling hydrocarbon oil into lower boiling hydrocarbon oil, the improvement which comprises heating said oil to a cracking temperature in a metallic coil composed of an alloy of chromium, nickel and iron, said coil being substantially resistant to the action of sulphur.

7. An apparatus for use in a process wherein hydrocarbon oil is subjected to cracking conditions which comprises a container adapted to receive hydrocarbon oil undergoing cracking composed of an alloy of iron and chromium substantially resistant to the corrosive action of sulfur or sulfur compounds.

8. An apparatus for use in a process wherein hydrocarbon oil is subjected to cracking conditions which comprises a container adapted to receive hydrocarbon oil undergoing cracking composed of an alloy of iron, chromium and nickel substantially resistant to the corrosive action of sulfur or sulfur compounds.

9. A process of treating hydrocarbon oil which comprises subjecting hydrocarbon oil to a temperature sufficiently high to effect cracking thereof while in contact with a container composed of an alloy of chromium and iron substantially resistant to the corrosive action of sulfur or sulfur compounds.

10. A process of treating hydrocarbon oil which comprises subjecting hydrocarbon oil to a temperature sufficiently high to effect cracking thereof while in contact with a container composed of an alloy of chromium, nickel and iron substantially resistant to the corrosive action of sulfur or sulfur compounds.

JOHN C. BLACK.

85 District Court of the U. S. for the D. of C.

Case No. 61481 Date May 19, 1938

Exhibit No. In Evid. Plaintiff's 10

Crecelius Patent No. 2,089,599.

Filed May 23 1938

See Ex parte Crecelius

31 U. S. P. Q. 326
Decision Court of Customs and Patent Appeals
Decision dated Nov. 30, 1936.

Claims 6, 7 and 8 of patent are substantially claims 34, 35 and 36 of decision.

Patented Aug. 10, 1937 **2,089,599**

UNITED STATES PATENT OFFICE

2,089,599

PROCESS OF TREATING COAL AND COMPOSITION THEREFOR

Lawrence P. Crecelius, Shaker Heights, Ohio

No Drawing. Application May 5, 1932, Serial No. 609,549

20 Claims. (Cl. 44—4)

This invention relates to a process for the treating of coal and the burning of the same, which coal contains relatively large amounts of iron sulphur compounds, such as iron pyrites, for the purpose of improving the burning of the coal, obviating deleterious flue gas and tube slagging, and to improve the ash characteristics.

The advance in the art of power production in power plants has been signalized by much higher rates of burning of coal in furnaces than heretofore practiced and an accompanying relative diminution of the air supplied for two main purposes. The higher rates of burning of coal was done for the purpose of increasing the capacity of a given plant, and the second purpose of relative diminution of air supplied was effected for the purpose of decreasing stack losses. The effect of this advance or change in practice, has been to bring about much higher furnace temperatures than were usually regarded as good practice in the past. It has also decreased very materially the amount of air available for oxidizing the various elements in the coal used for combustion. Furthermore, it has operated to increase the speed of heat liberation, and, therefore, decrease the time element for combustion.

The whole effect in this change in the art has operated to disqualify and eliminate, to a very large extent, the use of coals high in iron sulphur compounds, such as are mined in western Pennsylvania, Ohio, Indiana, Illinois and many other states. The reason for the foregoing is the objectionable and disastrous clinkering which is produced by coals high in iron sulphur compounds, which when subjected to the furnace conditions mentioned before, decompose to ferrous sulphide, which melts at approximately 2140° F., running down on to the grate surfaces, obstructing to a large extent the passage of air through the grates, and additionally, fusing to the iron of the grate bars, thereby becoming permanently affixed thereto. In the second place, due to the high blasting for heavy overloads, particles of coal are driven off from the burning fuel and are blasted against the boiler tube surfaces. Owing to the high temperature of the furnaces, in excess of 2140° F., the ferrous sulphide particles which are carried by the coal are more or less plastic and accumulate on such tube surfaces, permanently fastening themselves to such surfaces and giving rise to tube slagging. In the third place these ferrous sulphide particles collect on the economizer and preheater surfaces, where, due to the low temperature, the ferrous sulphide oxidizes to ferric sulphate, which converts sulphur dioxide of the flue gases into sulphuric acid and gives rise to corrosion on the economizer and the preheater surfaces.

I have discovered that when such coal as has hereinbefore been referred to is burned in the presence of chlorine, the ferrous sulphide becomes decomposed and quickly forms its stable oxides, namely, ferric oxide and sulphur dioxide, the first of which passes to the ash and the second of which passes out of the stack, and that consequently the difficulties in burning coals with high iron sulphur compounds, are obviated. To accomplish the introduction of chlorine during the burning of the coal, two methods may be employed, one of which consists in injecting chlorine gas directly into the burning bed of coal, which may be readily accomplished by passing in the chlorine along with the air supplied for combustion, the chlorine thus finding its way into and through the burning fuel.

Another method, and the one which will be described more at length, contemplates that the necessary chlorine may be introduced into the furnace, by employing suitable chemicals, which are preferably first sprayed upon and distributed through the coal to be burned.

Speaking in general terms, the chemicals used may be said to comprise a suitable deliquescent halogen compound, such for instance, as calcium chloride or magnesium chloride or mixtures of the two, together with suitable catalytic material, such as manganese dioxide, iron oxide, chromium oxide, used two or more of them together, give most satisfactory results.

Preferably the composition which has just been described, may be made up as a liquid and distributed over the coal uniformly by spraying it upon the same, preferably at the mine, so that its quantity and distribution may be properly controlled, and thereafter the coal may be shipped in the usual way to its destination. However, under such circumstances, it is necessary in order to maintain the composition properly distributed and associated with the coal, to provide a fixer, which renders the composition substantially unaffected by exposure, to which the coal may be subjected in transit, thus making certain of the presence of the treating compound in the coal when the coal is burned.

One suitable composition for treating the coal is made up as follows:

	Percent by weight
Calcium chloride	92
Potassium dichromate	3
Manganese dioxide	3
Tannic acid	2

It has been found that a quantity of the above composition equal to approximately 5% of the sulphur content in the coal is suitable for the purpose.

The reactions when coal is burned with a composition of the general character recited above are as follows:

Calcium chloride ($CaCl_2$)

This medium is inherently deliquescent and provides the small amount of water necessary to the process, inasmuch as both chlorine and steam are essential. Calcium chloride decomposes under heat (beginning at a temperature of about 932° F., and terminating at a temperature of about 1652° F.), yielding calcium oxide (CaO) and hydrochloric acid (HCl). Hydrochloric acid alone is not satisfactory for decomposing iron sulphide but must be converted into chlorine. To accomplish this two catalysts are employed.

Catalysts

Manganese dioxide (MnO_2) and chromium oxide are employed for conversion of the hydrochloric acid into chlorine. Although, with respect to the formation of chlorine from hydrochloric acid, manganese dioxide and chromium oxide perform as catalytic agents, it has been found that when manganese dioxide and chromium oxide are used together the catalytic conversion of hydrochloric acid into chlorine is accelerated by some six or more times the activity of either one used alone. The chromium oxide functions as a promoter catalytic agent. Obviously by the use of the terms "manganese dioxide" and "chromium oxide" there will be included as coming within the same scope, chemical substances which when heated decompose to form manganese dioxide and chromium oxide, respectively, where such substances produce the effect of manganese dioxide and chromium oxide in the conversion of chlorine in the burning of the coal as previously described.

In order to affix the calcium chloride and the manganese dioxide and the potassium dichromate to the coal sufficiently well to insure its retention against rain and snow, I add as a fixative, tannic acid ($C_{14}H_{10}O_9$). I have found that instead of supplying the chromium oxide directly, that when potassium dichromate is substituted, the fixative step is brought into play. This is due to the fact that the potassium dichromate and tannic acid react upon one another in the presence of moisture and produce an insoluble flocculent tanninbichromate precipitate which affixes the whole to the coal and secondly, that under heat at the proper temperature, the tanninbichromate is oxidized producing the chromium oxide required as a catalyst, as before described.

Without in any way intending to limit myself in any precise way to the description which follows, the general reactions occurring in the burning fuel bed may be generally stated as follows:

Beginning at a temperature of approximately 932° F., and up to a temperature of approximately 1652° F., the deliquescent calcium chloride is decomposed into calcium oxide and hydrochloric acid. The effectiveness of the hydrochloric acid after its liberation in decomposing iron sulphide is not limited to its acidic properties, but is tremendously advanced by its catalytic conversion into chlorine, due to the presence of the manganese dioxide and chromium oxide. The iron sulphide is attacked by both hydrochloric acid and chlorine, principally the latter, yielding ferrous chloride and hydrogen sulphide, both of which are volatile and rapidly converted into ferric oxide and sulphur dioxide together with a liberation of hydrochloric acid, which, due to the continued presence of the catalytic agents before mentioned, is converted again and again, with violent rapidity into free chlorine, to repeatedly attack the ferrous sulphide in the manner previously described. The repeated cycles of reactions explains the comparatively small quantities of chemicals employed in treating the coal.

While I have before indicated that there is some latitude in the employment of chemical substances to accomplish the desired result, it should be noted, however, that the chemicals used must be capable of effecting the reactions necessary to the production of chlorine in the burning fuel at a temperature below the fusion temperature of ferrous sulphide, which is approximately 2140° F.

It will be obvious that the chemical materials with which the coal is treated may be suitably prepared in the correct proportions and shipped as an article of commerce to be applied to the coal, either at the coal mine or applied to the coal just previous to its use. It has been found advantageous to apply the mixture of materials to the coal at the mine, and where this is done the coal, with the chemical materials applied thereto, is shipped as an article of commerce to the consumer.

This application is a continuation in part of application Serial No. 541,523, filed June 1, 1931, in the name of Lawrence P. Crecelius.

While in the foregoing specification the invention has been described in connection with the treatment and burning of coal, it will be understood that it is intended to include not only coal but coke, lignite, peat and other substances of similar category wherein is involved the problem of the removal of iron sulphur compounds.

Having thus described my invention, what I claim is:

1. A composition of matter for the treatment of coal comprising a chloride which upon heating decomposes below the fusion temperature of iron sulphide, together with manganese dioxide and a substance containing chromium oxide.

2. A composition of matter for the treatment of coal comprising a deliquescent chloride, manganese dioxide and a substance containing chromium oxide.

3. A composition of matter for the treatment of coal comprising a chloride which upon heating decomposes below the fusion temperature of iron sulphide, together with manganese dioxide, potassium dichromate and tannic acid.

4. A composition of matter for the treatment of coal comprising calcium chloride, manganese dioxide and potassium dichromate.

5. A composition of matter for the treatment of coal comprising calcium chloride, manganese dioxide, potassium dichromate and tannic acid.

6. A composition of matter for the treatment of coal comprising a chloride which upon heating decomposes below the fusion temperature of iron sulphide, together with an inorganic oxidizing agent and an oxidation catalyst of the type of manganese dioxide.

7. A composition of matter for the treatment of coal comprising a chloride which upon heating decomposes below the fusion temperature of iron sulphide, together with an oxidation catalyst of the type of manganese dioxide and an oxidizing agent which acts as a promoter catalyst.

8. A composition of matter comprising a deliquescent chloride, potassium dichromate and tannic acid.

9. The method of treating coal for the purposes described, which consists in applying to the coal

a composition containing calcium chloride, manganese dioxide, potassium dichromate and tannic acid.

10. The method of treating coal for the purposes described, which consists in applying to the coal a composition containing a chloride which upon heating decomposes at a temperature below the fusion point of iron sulphide, an oxidation catalyst of the type of manganese dioxide and an oxidizing agent which acts as a promoter catalyst.

11. The method which consists in burning in the presence of air, coal containing iron sulfur compounds in such quantity as to normally form objectionable clinker and subjecting the burning coal to the action of a chloride which decomposes at a temperature below the fusion point of iron sulphide, together with a catalytic agent and a promoter catalytic agent whereby by chemical action there is provided a continuous and sufficient supply of chlorine to effect substantial decomposition of the iron sulfur compounds to form a stable oxide of iron and a stable oxide of sulfur.

12. The method which consists in burning in the presence of air, coal containing iron sulfur compounds in such quantity as to normally form objectionable clinker and subjecting the burning coal to the action of calcium chloride, together with a catalytic agent and a promoter catalytic agent, whereby by chemical action there is provided a continuous and sufficient supply of chlorine to effect substantial decomposition of the iron sulfur compounds to form a stable oxide of iron and a stable oxide of sulfur.

13. The process which consists of burning in the presence of air, coal containing iron sulfur compounds in such quantity as to normally form objectionable clinker and subjecting the burning coal to the action of a chloride which decomposes at a temperature below the fusion point of iron sulphide, together with manganese dioxide and chromium oxide to thereby produce a continuous and sufficient supply of chlorine in the burning coal during the combustion thereof to effect a substantial decomposition of iron sulphide into a stable oxide of iron and a stable oxide of sulfur.

14. The process which consists of burning in the presence of air, coal containing iron sulfur compounds in such quantity as to normally form objectionable clinker and subjecting the burning coal to the action of a calcium chloride, together with manganese dioxide and chromium oxide to thereby produce a continuous and sufficient supply of chlorine in the burning coal during the combustion thereof to effect a substantial decomposition of iron sulphide into a stable oxide of iron and a stable oxide of sulfur.

15. The method which consists in burning in the presence of air, coal containing iron sulfur compounds in such quantity as to normally form objectionable clinker and subjecting the burning coal to the action of a chloride which decomposes at a temperature below the fusion point of iron sulphide together with an oxidizing catalyst of the type of manganese dioxide, and an inorganic oxidizing agent whereby by chemical action there is provided a continuous and sufficient supply of chlorine to effect substantial decomposition of the iron sulfur compound to form a stable oxide of iron and a stable oxide of sulfur.

16. The method which consists in burning in the presence of air, coal containing iron sulfur compounds in such quantity as to normally form objectionable clinker and subjecting the burning coal to the action of a calcium chloride, together with an oxidizing catalyst of the type of manganese dioxide, and an inorganic oxidizing agent whereby by chemical action there is provided a continuous and sufficient supply of chlorine to effect substantial decomposition of the iron sulfur compound to form a stable oxide of iron and a stable oxide of sulfur.

17. As an article of commerce, coal upon which there has been deposited a mixture of calcium chloride together with manganese dioxide, potassium dichromate and tannic acid, which causes the mixture to become fixed upon the coal.

18. As an article of commerce, coal upon which there has been deposited a mixture of a deliquescent chloride together with a mixture of an oxidation catalyst of the type of manganese dioxide, an inorganic oxidizing agent and a substance which fixes the said material upon the coal.

19. As an article of commerce, coal upon which there has been deposited a mixture of a deliquescent chloride together with a mixture of an oxidation catalyst of the type of manganese dioxide, an inorganic oxidizing agent and tannic acid.

20. As an article of commerce, coal upon which there has been deposited a mixture of a deliquescent chloride together with a catalyst and a promoter catalyst and a substance which fixes the chloride and catalytic material upon the coal.

LAWRENCE P. CRECELIUS.

88 *Memorandum Filed May 23, 1938.*

I agree with the opinion of the Board of Appeals of the Patent Office in holding that the plaintiffs claim No. 7, does not specify the proportions of the components of the alloy in such a definite way that it can be made without resorting to experiment and therefore fails to clearly define the invention, and also that the claim is broader than the invention discloses.

The bill should be dismissed with costs.

BAILEY
J

89 *Findings of Fact.*

Filed Jun 8 1938

1. This is a suit brought under the provisions of Section 4915 R. S. (U. S. C., title 35, sec. 63.), to have the Commissioner of Patents authorized to issue to plaintiffs a patent on the application of Charles J. Koebel, Serial No. 586,238, filed January 12, 1932, containing claim 7 as set out in paragraph 10 of the bill of complaint, reading as follows:

7. As a new article of manufacture, a setting for diamonds consisting of a base metal alloy the principal ingredients of which are molybdenum, copper and cobalt so proportioned as to be capable of being sintered at a temperature below that of the critical point at which the desirable qualities of the diamond are adversely affected, said alloy when so sintered having the property of wetting the diamonds coupled with a lack of avidity for the carbon thereof and, when thereafter cooled, of closely adhering to it.

2. Plaintiff Charles J. Koebel's application No. 586,238 discloses an alloy of molybdenum, colbalt and copper. The specification states that the application "relates generally to alloys and has more particularly reference to alloys used for the purpose of setting diamonds." The specification gives only two examples. In these the proportions 90 of the ingredients are given. One of these examples includes 00.25% of iron. No ranges of the proportions of the ingredients are stated in the specification.

3. Claim 7 states no proportions of the ingredients. It specifies only that the principal ingredients are molybde-

num, cobalt and copper and that these ingredients are so proportioned as to be capable of being sintered at a temperature below that of the critical points at which the desirable qualities of the diamond are adversely affected.

Conclusions of Law.

1. Claim 7 does not clearly define the invention.
2. Claim 7 is broader than the invention disclosed in plaintiff Charles J. Koebel's application.
3. Plaintiffs are not entitled to a patent on the said application containing claim 7.
4. The bill should be dismissed.

JENNINGS BAILEY
Justice.

91 *Final Decree*

Filed Jun 8 1938

This cause having come on to be heard and having been tried in open court and argued by counsel for the respective parties upon the pleadings and proofs adduced and submitted to the Court,

It is ADJUDGED, ORDERED and DECREED this 8th day of June, 1938, that the Bill of Complaint in this case be, and the same hereby is dismissed with costs against the plaintiff.

JENNINGS BAILEY
Justice.

Approved as to Form:

AXEL V. BEEKEN
Attorney for Plaintiff

92 *Notice of Appeal*

Filed Jun 22 1938

From the final decree made and entered herein on or about June 8, 1938, the plaintiffs Charles J. Koebel and Koebel Diamond Tool Co. hereby on this 22nd day of June, 1938, note an appeal to the United States Court of Appeals for the District of Columbia.

AXEL V BEEKEN
Solicitor for Plaintiffs

Notice of the above appeal hereby acknowledged and citation waived this 22 day of June, 1938.

R. F. WHITEHEAD
Solicitor of United States Patent Office For Conway P. Coe, Commissioner of Patents.

93 *Order Fixing Bond on Appeal*

Filed Jun 22 1938

The plaintiffs Charles J. Koebel and Koebel Diamond Tool Co. having filed their notice of appeal from the final decree made and entered herein on or about June 8, 1938, together with defendant's acknowledgment of notice of such appeal and waiver of citation,

IT IS ORDERED this 22nd day of June, 1938, that the amount of security for costs which the plaintiffs shall give on said appeal be and the same is hereby fixed at the sum of one hundred dollars or fifty dollars cash in lieu thereof.

JENNINGS BAILEY
Justice.

Memorandum

June 22, 1938.

$50 deposited by Axel V. Beeken in lieu of bond on appeal.

94 *Assignments of Error*

Filed Jul 8 1938

The plaintiffs, Charles J. Koebel and Koebel Diamond Tool Co., and each of them, by their attorney, in connection with their appeal to the United States Court of Appeals for the District of Columbia from the decree made and entered in the above-entitled cause on the 8th day of June, 1938, hereby assign the following as errors and grounds for appeal:

The District Court of the United States for the District of Columbia erred:

1. In entering a decree to dismiss the bill of complaint and in not entering a decree granting to the plaintiffs the relief prayed for in the bill of complaint:

95 2. In entering a decree to dismiss the bill of complaint and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

3. In entering a decree to dismiss the bill of complaint and in not finding that the applicant Koebel having made a meritorious invention of a primary character, i. e. a setting for diamonds for industrial purposes cheaper to manufacture and having a longer life than others of the prior art and which has gone into extensive use, the plaintiffs are entitled to the grant of the claim (7) to adequately protect such meritorious invention, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

4. In entering a decree to dismiss the bill of complaint and in finding and holding that the Koebel application Ser. No. 586,238 merely "discloses an alloy of molybdenum, cobalt and copper" and in not finding that the claims (including said claim 7) in the Koebel application have always been directed to a setting for diamonds and not to an alloy as such, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

5. In entering a decree to dismiss the bill of complaint and in not finding that none of the references relied upon by the Commissioner of Patents, i. e. Fahrenwald No. 1,346,190, Sattler No. 1,773,793 and British patent
96 No. 331,414, discloses a sintered setting for diamonds, the principal ingredients of which are molybdenum, copper and cobalt and having the other characteristics recited in said claim 7 of said Koebel application Ser. No. 586,238; and that said claim (7) fully distinguishes over these references, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

6. In entering a decree to dismiss the bill of complaint and in not finding that the Commissioner of Patents by the Examiner in charge of Koebel application Ser. No. 586,238 admitted that the references cited by him, i. e. Fahrenwald No. 1,346,190, Sattler No. 1,773,793 and British No. 331,414 "were cited only to show that alloys containing the three elements mentioned were old. These patents were not considered to meet the invention", and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

7. In entering a decree to dismiss the bill of complaint and in not finding that the specification of the Koebel application Ser. No. 586,238 sets out two species or forms of the invention merely "by way of example but not of limitation" and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

97 8. In entering a decree to dismiss the bill of complaint and in not finding that the applicant, Koebel, having disclosed more than one specie or form of the invention in his application Ser. No. 586,238, the plaintiffs are entitled to the grant of the generic claim (7), and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

9. In entering a decree to dismiss the bill of complaint and in not finding that the applicant, Koebel, having disclosed more than one specie or form in his application, Ser. No. 586,238, the invention in its primary aspect resides in a setting for diamonds having certain characteristics and ingredients and not necessarily in the specific proportions of said ingredients and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

10. In entering a decree to dismiss the bill of complaint and in not finding that the invention is fully disclosed in the specification of said Koebel application Ser. No. 586,238 enabling those skilled in the art to exercise it without

resorting to experiment, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

11. In entering a decree to dismiss the bill of complaint and in not finding that claim 7 of the Koebel application Ser. No. 586,238 clearly defines the invention disclosed in said application, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint: 98

12. In entering a decree to dismiss the bill of complaint and in not finding that claim 7 of the Koebel application Ser. No. 586,238 is not broader than the invention disclosed in said application, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

13. In entering a decree to dismiss the bill of complaint and in finding and holding that claim 7 of said Koebel application Ser. No. 586,238 specifies "only that the principal ingredients are molybdenum, cobalt and copper and that these ingredients are so proportioned as to be capable of being sintered at a temperature below that of the critical points at which the desirable qualities of the diamond are adversely affected", and in not finding that said claim also specifies the other characteristics of the setting to be "having the property of wetting the diamonds coupled with a lack of avidity for the carbon thereof and, when thereafter cooled, of closely adhering to it", and in not entering a decree authorizing the Commissioner of Patent to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

14. In entering a decree to dismiss the bill of complaint and in finding and holding that claim 7 of said Koebel application Ser. No. 586,238 "does not specify the proportions of the components of the alloy in such definite way that it can be made without resorting to experiments and therefore fails to clearly define the invention" and in not finding that the claim is directed to a product the characteristics of which are clearly defined, and 99

that the specification clearly discloses the method of making the product, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

15. In entering a decree to dismiss the bill of complaint and in not finding that it is not essential in a product claim to specify the method of making the product and in not finding that the claim sufficiently points out the characteristics of the product constituting the invention, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint.

Wherefore plaintiffs pray that the decree be reversed and that the Court be directed to authorize the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint.

AXEL V BEEKEN
Attorney for Appellants

New York, N. Y.,
July 6, 1938.

Service of a copy of the above assignments of error acknowledged this 8th day of July, 1938.

R. F. WHITEHEAD
Attorney for Appellee

100 *Stipulation as to Designation of Record*

Filed Jul 8 1938

It is hereby stipulated by and between attorneys for the respective parties that the following parts of the original proceedings shall constitute the transcript on appeal, said parts being considered sufficient for the determination of the questions raised on appeal:

1. Bill of complaint under R. S. 4915 filed May 20, 1936:
2. Answer filed May 29, 1936:
3. Stipulation between counsel as to deposition of Charles J. Koebel, the affidavit of said Koebel attached thereto, the annexed Schedule C; and physical exhibits A and B thereof:

4. Plaintiff's Exhibit No. 1. Certified copy Patent Office proceedings in Koebel application Ser. No. 586,238 including:

Petition and Power of Attorney
Specification and claims
Oath
Patent Office Action of Feb. 18, 1932
101 Applicant's communication of August 2, 1932.
Patent Office Action of Sept. 1, 1932.
Applicant's communication of February 28, 1933.
Patent Office Action of March 7, 1933.
Applicant's communication of September 6, 1933.
Patent Office Action of September 12, 1933.
Applicant's communication of March 8, 1934.
Patent Office Action of March 13, 1934.
Applicant's communication of September 12, 1934.
Patent Office Action of September 18, 1934.
Applicant's communication of March 15, 1935.
Examiner's statement of March 25, 1935.
Decision of November 23, 1935 of the Board of Appeals.
Patent Office Certificate of May 5, 1938.

5. Plaintiff's Exhibit No. 3, British patent to Tigerschiold No. 331,414 with memorandum attached.

6. Plaintiff's Exhibit No. 4. U. S. Patent to Sattler No. 1,773,793 with memorandum attached.

7. Plaintiff's Exhibit No. 5. U. S. Patent to Fahrenwald No. 1,346,190 with memorandum attached.

8. Plaintiff's Exhibit No. 6. U. S. Patent to Bailey No. 2,054,801 with memorandum attached.

9. Plaintiff's Exhibit No. 7. U. S. Patent to Hallock No. 1,695,845 with memorandum typed thereon (at top of first page).

10. Plaintiff's Exhibit No. 8. U. S. Patent to Hart No. 1,877,237 with memorandum written thereon (at top of first page).

11. Plaintiff's Exhibit No. 9. U. S. Patent to Black No. 2,075,164 with memorandum written thereon:

12. Plaintiff's Exhibit No. 10. U. S. Patent to Crecelius No. 2,089,599 with memorandum attached thereto.

13. Memorandum of Justice Bailey filed May 23, 1938:

14. Findings of Fact and Conclusions of Law filed June 8, 1938:

102 15. Final Decree of June 8, 1938:

16. Notice of Appeal and Waiver of Citation of June 22, 1938:

17. Order Fixing Bond on Appeal of June 22, 1938:

18. Memorandum of deposit of costs on appeal:

19. Assignments of Error:

20. Designation of Record on Appeal:

21. Clerk's certificate.

Signed this Eighth day of July, 1938.

R. F. WHITEHEAD
Solicitor of United States Patent Office for Conway P. Coe, Commissioner of Patents.

AXEL V. BEEKEN
Attorney for Appellants

103 District Court of the United States for the District of Columbia

UNITED STATES OF AMERICA,
District of Columbia, ss:

I, Charles E. Stewart, Clerk of the District Court of the United States for the District of Columbia, hereby certify the foregoing pages numbered from 1 to 102, both inclusive, to be a true and correct transcript of the record according to directions of counsel herein filed, copy of which is made part of this transcript, in cause No. 61481 in Equity, wherein Charles J. Koebel and Koebel Diamond Tool Co. are Plaintiffs and Conway P. Coe, Commissioner of Patents, is Defendant, as the same remains upon the files and of record in said Court.

IN TESTIMONY WHEREOF, I hereunto subscribe my name and affix the seal of said Court, at the City of Washington, in said District, this 10th day of August, 1938.

CHARLES E STEWART,
Clerk.

By CHAS B COFLIN,
(Seal) *Assistant Clerk.*

Endorsed on Cover: No. 7225 Koebel, et al., Appellants, v. Coe. United States Court of Appeals for the District of Columbia Filed Aug 11 1938 Joseph W. Stewart, Clerk.

IN THE

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA

APRIL TERM, 1938

UNITED STATES
COURT OF APPEALS FOR THE
DISTRICT OF COLUMBIA
FILED DEC 9 - 1938
Joseph W. Stewart
CLERK

CHARLES J. KOEBEL and KOEBEL DIAMOND TOOL CO., *Plaintiffs-Appellants,* *vs.* CONWAY P. COE, Commissioner of Patents, *Defendant-Appellee.*	No. 7225

Appeal from the Decision of the District Court of the United States for the District of Columbia in suit under R.S. 4915.

BRIEF ON BEHALF OF PLAINTIFFS-APPELLANTS

AXEL V. BEEKEN,
Attorney for Plaintiffs-Appellants,
1053 National Press Building,
Washington, D. C.

233 Broadway,
New York, New York.

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IN THE

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA

CHARLES J. KOEBEL and
KOEBEL DIAMOND TOOL CO.,
Plaintiffs-Appellants,

vs.

CONWAY P. COE,
Commissioner of Patents,
Defendant-Appellee.

No. 7225

BRIEF IN BEHALF OF PLAINTIFFS-APPELLANTS

STATEMENT OF CASE

This is a suit brought under the provisions of Section 4915 R.S. (35 U.S.C.A. § 63) to have the Commissioner of Patents authorized to issue a patent on the application of Charles J. Koebel, Ser. No. 586,238 filed January 12, 1932, containing claim 7 as set out in paragraph 10 of the bill of complaint (R3); and comes up on appeal by the plaintiffs-appellants from a final decree of dismissal of the United States District Court for the District of Columbia.

The rejected claim recites "As a new article of manufacture, a setting for diamonds consisting of a base metal alloy'' etc. and the specification (R23) recites two different examples or species of the invention ''By way of example, but not of limitation''. Claim 7 is a generic claim that is not limited to specific percentages of the ingredients employed and therefore covers both species. The Court below held in effect that the claim does not clearly define the invention and that it is broader than the invention disclosed in the Koebel application. That does not mean, however, that the specification fails to disclose the invention, that is not the contention of the Commissioner; nor is this a case where an applicant attempts to expand his claim after the filing of the application.

The disputed claim is as follows:

> As a new article of manufacture, a setting for diamonds consisting of a base metal alloy the principal ingredients of which are molybdenum, copper and cobalt so proportioned as to be capable of being sintered at a temperature below that of the critical point at which the desirable qualities of the diamond are adversely affected, said alloy when so sintered having the property of wetting the diamonds coupled with a lack of avidity for the carbon thereof and, when thereafter cooled, of closely adhering to it.

The Court below made only findings of ultimate facts and refused to make findings of evidentiary facts. But the question here involved cannot be argued as a pure question of law because in order to ascertain whether or not the claim is broader than the invention or does or does not clearly define the invention, it is obviously necessary first to find out what the invention consists of and its significance in the art. In the absence of findings of evidentiary facts, it is therefore necessary, in addition to discussing the legal questions involved, to analyze the proofs submitted at the trial as well as the record of the case in the Patent Office.

ASSIGNMENT OF ERRORS RELIED UPON.

The assignment of errors are found at pp. 82 to 86 of the record and are as follows:

The District Court of the United States for the District of Columbia erred:

1. In entering a decree to dismiss the bill of complaint and in not entering a decree granting to the plaintiffs the relief prayed for in the bill of complaint:

2. In entering a decree to dismiss the bill of complaint and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

3. In entering a decree to dismiss the bill of complaint and in not finding that the applicant Koebel having made a meritorious invention of a primary character, i.e. a setting for diamonds for industrial purposes cheaper to manufacture and having a longer life than others of the prior art and which has gone into extentive use, the plaintiffs are entitled to the grant of the claim (7) to adequately protect such meritorious invention, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

4. In entering a decree to dismiss the bill of complaint and in finding and holding that the Koebel application Ser. No. 586,238 merely "discloses an alloy of molybdenum, cobalt and copper" and in not finding that the claims (including said claim 7) in the Koebel application have always been directed to a setting for diamonds and not to an alloy as such, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

5. In entering a decree to dismiss the bill of complaint and in not finding that none of the references relied upon

by the Commissioner of Patents, i.e. Fahrenwald No. 1,346,190, Sattler No. 1,773,793 and British patent No. 331,414, discloses a sintered setting for diamonds, the principal ingredients of which are molybdenum, copper and cobalt and having the other characteristics recited in said claim 7 of said Koebel application Ser. No. 586,238; and that said claim (7) fully distinguishes over these references, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

6. In entering a decree to dismiss the bill of complaint and in not finding that the Commissioner of Patents by the Examiner in charge of Koebel application Ser. No. 586,238 admitted that the references cited by him, i.e. Fahrenwald No. 1,346,190, Sattler No. 1,773,793 and British No. 331,414 "were cited only to show that alloys containing the three elements mentioned were old. These patents were not considered to meet the invention", and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

7. In entering a decree to dismiss the bill of complaint and in not finding that the specification of the Koebel application Ser. No. 586,238 sets out two species or forms of the invention merely "by way of example but not of limitation" and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

8. In entering a decree to dismiss the bill of complaint and in not finding that the applicant, Koebel, having disclosed more than one specie or form of the invention in his application Ser. No. 586,238, the plaintiffs are entitled to the grant of the generic claim (7), and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238,

containing claim 7 as set out in paragraph 10 of the bill of complaint:

9. In entering a decree to dismiss the bill of complaint and in not finding that the applicant, Koebel, having disclosed more than one specie or form in his application, Ser. No. 586,238, the invention in its primary aspect resides in a setting for diamonds having certain characteristics and ingredients and not necessarily in the specific proportions of said ingredients and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

10. In entering a decree to dismiss the bill of complaint and in not finding that the invention is fully disclosed in the specification of said Koebel application Ser. No. 586,238 enabling those skilled in the art to exercise it without resorting to experiment, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

11. In entering a decree to dismiss the bill of complaint and in not finding that claim 7 of the Koebel application Ser. No. 586,238 clearly defines the invention disclosed in said application, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

12. In entering a decree to dismiss the bill of complaint and in not finding that claim 7 of the Koebel application Ser. No. 586,238 is not broader than the invention disclosed in said application, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

13. In entering a decree to dismiss the bill of complaint and in finding and holding that claim 7 of said Koebel application Ser. No. 586,238 specifies "only that the principal ingredients are molybdenum, cobalt and copper and that these ingredients are so proportioned as to be capable of being sintered at a temperature below that of the critical points at which the desirable qualities of the diamond are adversely affected", and in not finding that said claim also specifies the other characteristics of the setting to be "having the property of wetting the diamonds coupled with a lack of avidity for the carbon thereof and, when thereafter cooled, of closely adhering to it", and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

14. In entering a decree to dismiss the bill of complaint and in finding and holding that claim 7 of said Koebel application Ser. No. 586,238 "does not specify the proportions of the components of the alloy in such definite way that it can be made without resorting to experiments and therefore fails to clearly define the invention" and in not finding that the claim is directed to a product the characteristics of which are clearly defined, and that the specification clearly discloses the method of making the product, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint:

15. In entering a decree to dismiss the bill of complaint and in not finding that it is not essential in a product claim to specify the method of making the product and in not finding that the claim sufficiently points out the characteristics of the product constituting the invention, and in not entering a decree authorizing the Commissioner of Patents to issue a patent on the Koebel application Ser. No. 586,238, containing claim 7 as set out in paragraph 10 of the bill of complaint.

THE FACTS

This invention deals with a very ancient art that has changed but little during the centuries; it fills a long-felt want; great economies and increased efficiency have resulted from its use, and it has had great commercial success.

As the claim in issue recites, the invention relates to "a setting for diamonds". It is, however, not the conventional setting of a stone in a ring or the like for adornment, but it is a setting for holding diamonds for industrial purposes, i.e. as in a tool for cutting, drilling or grinding material.

The uncontradicted testimony of the expert witness (R10-13) shows that

The art is a very old one going back to the pyramid builders of Egypt who used saws, the working faces of which were set with jewels.

Today, industrial diamonds are principally used in dressing tools for grinding wheels, as core bits for rock drilling, as saw teeth, as dies for drawing wire and in cutting, boring and grinding tools used in connection with the motor and other industries where exceedingly hard metals have to be acted upon and where great precision is required.

As shown by the application, excessive heat affects diamonds adversely; and it has been found that in most instances the critical point at which the desirable qualities of the diamond are impaired is in the neighborhood of 1380° Centigrade.

Metals having a melting point lower than the critical temperature mentioned are too soft to hold the diamonds properly.

Metals hard enough to hold the diamonds properly have a melting point above the critical temperature mentioned.

Diamonds used for industrial purposes have therefore generally been set by peening or hammering the metal around the stones, a slow hand operation requiring great skill and necessitating the use of relatively large stones.

Plaintiffs' setting is a sintered product (sintering means making or becoming coherent through partial fusion) composed principally of molybdenum, cobalt and copper, the sintering action taking place well below the critical temperature (1380° C) mentioned, thereby obtaining in the setting the advantage of the hardness of molybdenum whose melting point is 2535° C. The setting shrinks into close adherence (technically called "wetting") to the diamond and does not attack it. The result of the close adherence is that, instead of engaging the stone at only the few points possible in hand setting, the setting engages the stone at all points of its submerged portion so that the heat generated during the drilling or other use of the tool is rapidly carried away from the diamond by the setting.

The stones are thus mechanically set instead of by hand and consequently smaller stones can be used, thereby reducing the cost per carat from $9.35 to $6.00 and increasing the production from two tools each carrying 40 diamonds per man per day to ten tools each carrying 224 diamonds per man per day.

Core bits, for drilling rock, provided with plaintiffs' invention will drill 2900 feet without impairment as against 600 feet with the old style setting.

Schedule C (R14-20) shows the extensive use of the setting both here and abroad.

The sales of the setting in a relatively short time have amounted to over a million dollars.

The hand setting of the prior art and the mechanical setting of the present invention are shown in physical exhibits A and B.

The Invention Is Broadly New and Is Admittedly Not Anticipated by The Prior Art.

Although the Examiner in his statement before the Board of Appeals of the Patent Office set up three prior patents, he admitted:

> "The above patents, cited only against claim 7, were cited only to show that alloys containing the three elements mentioned were old. These patents were not considered to meet the invention."
> (R41-42)

Neither the Board of Appeals nor the Court below held that the three patents anticipated the invention.

An analysis of the three patents referred to by the Examiner shows that none of them discloses a sintered product or a setting for diamonds.

None of the references discloses an alloy which *consists* of a base metal alloy the *principal* ingredients of which are molybdenum, copper and cobalt. In Fahrenwald, the firearm barrel, as shown by the claims, is made of an alloy containing nickel in the proportion of twenty-five to ninety percent and the balance copper. The fact that a small proportion of one or more of the following may be added, chromium, molybdenum, tungsten, cobalt, venadium, tantalum, zirconium, titanium, aluminum, iron, manganese, zinc, cadmium, is immaterial. In Sattler, a permanent magnet is made from a steel alloy in which 0.5% to 1.5% of molybdenum, 0.5% to 1% of copper and 0.5% to 3% of cobalt are present. See claim 1 of the Sattler patent. In the British patent to Tigerschiøld, which relates to vessels or pipes, the three elements in question likewise do not constitute the principal ingredients of the alloy.

THE LAW.

(To avoid needless repetition all the assignments of error will be argued under this head.)

The Preamble of the Claim in Issue Cannot Be Ignored.

As shown above, the claim in issue calls for "a setting for diamonds", and the patents cited admittedly do not anticipate it. Why was it rejected? In order to understand this anomalous situation it is necessary to go back to the first Office action of the Examiner (R26) where he states:

> "While the claims are in the form of a setting for diamonds, the claims in substance cover only an alloy and are so construed."

At the time he made this rejection, the Examiner cited no prior art. He merely decapitated the claims and treated them as calling for an alloy broadly and not for a diamond setting. This was error.

In Hall *v.* Shimadzu (59 F(2) 225) the Court of Customs and Patent Appeals said:

> "Generally speaking, it is well established that an introductory phrase will not be considered as a part of the subject-matter of a claim, but there are exceptions to this rule, and this was recognized in our opinion in said case where, speaking through Presiding Judge Graham, we said: '* * * It is true, as stated by the examiner of interferences, that in some cases courts have held that similar introductory words should be considered as limitations. * * *'
>
> With reference to the counts here in issue, we think that the phrase here under consideration is more than merely an introductory phrase, and is absolutely essential to point out the invention that is here involved.
>
> In the case of Schram Glass Co. *v.* Homer Brooke Glass Co. (C.C.A.) 249 F. 228, 229, there was involved the construction of the following phrase: An automatic device for cutting or separating an unsupported freely flowing stream of molten material into unformed molten masses.' In its opinion the court said: '* * * While it is true that this clause of itself does not describe an element in the combination, it should not for that reason be ignored. Each of the elements of the combination should be read in the light of this clause and should be modified by it. Such a clause of itself may entirely fail to supply a necessary element in a combination (Morgan Envelope Co. *v.* A. P. W. Co., 152 U. S. 425, 14 S. Ct. 627, 38 L.Ed. 500) yet it may so affect the enumerated elements as to give life and meaning and vitality to them, as they appear in the combination. * * *'"

So in this case the introductory phrase "a setting for diamonds" gives life, meaning and vitality to the claim because it is a necessary antecedent to that part of the claim which deals with the critical temperature point at which the desirable qualities of the diamond are adversely affected and therefore cannot be disregarded. Also it obviously excludes firearms and alloys for making same (Fahrenwald of record), permanent magnets (Sattler of record) and acid resisting vessels, pipes, machine parts (Tigerschiøld of record).

The Cases relied upon by Appellee do not support Appellee's contention.

Holland Furniture Company *v.* Perkins Glue Company (72 L.ed. 868-874; 277 U.S. 245-258) and General Electric Company *v.* Wabash Appliance Corporation, Abe Adler and Abe M. Parker (304 U. S. 364, 82 L.ed. 912-917) are the two Supreme Court cases relied upon below by Appellee.

In Holland *v.* Perkins the Court said:

> "The chosen starch ingredient was to possess such qualities that when combined with three parts of water and with alkali it would produce a product 'as good as animal glue' for veneering, or having the properties of animal glue, these properties being described in terms of its functions. The ingredient was thus described, not in terms of its own physical characteristics or chemical properties or those of the product, but wholly in terms of the manner of use of the product. Any glue made of a starch base, whatever its composition, water absorptiveness or other properties, combined with alkali and three parts of water, which has substantially the properties of animal glue, or is as good as animal glue for use in the wood-working trades, is claimed as Perkins' glue."

The Court continued:

> "One attempting to use or avoid the use of Perkins' discovery as so claimed and described func-

> tionally could do so only after elaborate experimentation. Respondents say that laboratory tests would be insufficient and that 'the best and probably the only satisfactory test is to try it out on a large scale in a furniture or veneering gluing factory'."

Note the words "elaborate experimentation." The Supreme Court certainly did not mean to exclude all experimentation because in Minerals Separation *v.* Hyde (61 L.ed. 286) it held:

> "Equally untenable is the claim that the patent is invalid for the reason that the evidence shows that when different ores are treated preliminary tests must be made to determine the amount of oil and the extent of agitation necessary in order to obtain the best results. Such variation of treatment must be within the scope of the claims, and the certainty which the law requires in patents is not greater than is reasonable, having regard to their subject-matter. The composition of ores varies infinitely, each one presenting its special problem, and it is obviously impossible to specify in a patent the precise treatment which would be most successful and economical in each case. The process is one for dealing with a large class of substances and the range of treatment within the terms of the claims, while leaving something to the skill of persons applying the invention, is clearly sufficiently definite to guide those skilled in the art to its successful application, as the evidence abundantly shows. This satisfies the law."

Obviously, many products cannot be tested by a merely visual or tactile examination. Thus, even if specific percentages of the three ingredients of Koebel's product were specified in the claim, it would be necessary to make both a qualitative and a quantitative analysis,—in other words, some experimentation would be necessary. The Supreme Court has not anywhere laid down any particular test to which all inventions must conform. Obviously, the invention itself will determine the test whereby the substance will reveal itself, and that cannot be ascertained until the invention is conceived. What the Supreme Court objected to was the indefinite test that the glue made from starch should be "as good as animal glue". That question could not in any event be determined except by testing out the glued veneer over a long period and under varying temperature and moisture conditions to ascertain the lasting qualities of the glue.

The present case is not in any way analogous to Holland *v.* Perkins because here it can be readily ascertained by the chemist or metallurgist if molybdenum, copper and cobalt are the three principal ingredients of the product and whether or not the product can be sintered at a temperature below the critical point mentioned. It is not even necessary to embody a diamond in the mass to establish that, and the test is therefore an entirely definite one.

The Court of Appeals of the District of Columbia has, since the rendering of the Supreme Court decision in Holland *v.* Perkins, had occasion to pass upon claims of a character similar to the Koebel claim in issue. The case referred to is Gasoline Products Co. *v.* Coe 87 F(2) 550, and the date of the decision is December 7, 1936. The application involved in that case was subsequently issued as patent to Black No. 2,075,164 (R71) and claims 1 and 2 of the patent were claims 13 and 14 of the decision.

Claims 1 and 2 of said patent are as follows:

> 1. In an apparatus for cracking petroleum oils for the production of lower boiling hydrocarbon oils, a metallic cracking coil substantially resistant to the action of sulphur, said metallic coil being composed of an iron and chromium alloy, said chromium in the alloy being in such proportions as to substantially prevent the corrosive action of sulphur.
>
> 2. In an apparatus for cracking petroleum oils for the production of lower boiling hydrocarbon oils, a metallic cracking coil substantially resistant to the action of sulphur, said metallic coil being composed of an iron chromium nickel alloy, said alloy being in such constituent proportions as to

> substantially prevent the corrosive action of sulphur.

Note the statements

> "said chromium in the alloy being in such proportions as to substantially prevent the corrosive action of sulphur."

and

> "composed of an iron chromium nickel alloy, said alloy being in such constituent proportions as to substantially prevent the corrosive action of sulphur."

Compare this with the language of the Koebel claim

> "a base metal alloy the principal ingredients of which are molybdenum, copper and cobalt so proportioned as to be capable of being sintered at a temperature below that of the critical point at which the desirable qualities of the diamond are adversely affected"

Certainly, if it were a general rule laid down by the Supreme Court that numerical percentages were necessary to render a claim valid, the Court of Appeals for the District of Columbia would not have allowed the claims of the Black patent even though the point of the necessity for such percentages was not specifically raised in the Black case by counsel for the Commissioner of Patents.

Also, it appears that the Patent Office has come around to appellants' point of view, for in a patent granted on November 15, 1938, No. 2,137,200, we find the following claim for an article in the same art as that to which the Koebel invention relates. The claim is as follows:

> An abrasive article consisting of abrasive comprising diamonds and a sintered bond therefor composed principally of aluminum and containing in an aluminum base alloy, a hardening agent consisting of an intermetallic compound of aluminum and another metal, in such an amount as to harden the bond but not to destroy its ductility.

Numerous other instances could be cited where both the Patent Office Board of Appeals and the Courts have passed favorably upon claims of a character similar to the Koebel claim here in controversy but, for the sake of brevity, we cite only the following instances:

In regard to the patent to Bailey No. 2,054,801 (R59-60), claim 1 is as follows:

> A composition of the class described comprising heat-treated castor oil, soft soap and glycerine.

This claim was rejected by the Examiner but on appeal the Board of Appeals of the Patent Office said:

> "The claims have also been rejected by the Examiner as not properly pointing out the invention in that they do not specify the particular proportions which are deemed essential. * * * it is believed that the present claims are sufficiently definite to point out the invention."

The date of this decision is March 31, 1936 which is subsequent to the decision of the Board in the instant case.

In the patent to Hart, No. 1,877,237 (R67-69), claim 1 is as follows:

> A therapeutic agent for use in connection with the treatment of anemia, including copper sulphate and a salt of iron combined to render effective the utilization of said salts for correcting the anemic condition of the blood.

This claim was sustained by the Circuit Court of Appeals in Wisconsin *v.* Breon & Co. (85 F(2) 166-172).

In the patent to Crecelius, No. 2,089,599 (R77-79), claims 6, 7 and 8 are as follows:

> 6. A composition of matter for the treatment of coal comprising a chloride which upon heating decomposes below the fusion temperature of iron sulphide, together with an inorganic oxidizing agent and an oxidation catalyst of the type of manganese dioxide.

> 7. A composition of matter for the treatment of coal comprising a chloride which upon heating decomposes below the fusion temperature of iron sulphide, together with an oxidation catalyst of the type of manganese dioxide and an oxidizing agent which acts as a promoter catalyst.
>
> 8. A composition of matter comprising a deliquescent chloride, potassium dichromate and tannic acid.

The claims in the application were rejected and the case was carried up to the Court of Customs and Patent Appeals which reversed the decision of the Patent Office and allowed the claims (see 31 U.S.P.Q. 326). The above-quoted claims 6, 7 and 8 were claims 34, 35 and 36 of the decision.

All of these cases were decided since the rendering of the decision in Holland *v.* Perkins.

In Holland *v.* Perkins (72 L. ed. 868; 277 U. S. 254) the Supreme Court laid down a broad rule for compliance with Section R.S. 4888 (35 U.S.C.A. 33) in the following language:

> "It was necessary that the Perkins patent, so far as it is a patent of a composition of matter, should contain some description of the ingredients entering into the composition which would both define the invention [citing authorities] and carry it beyond the previous development of the art."

For the sake of brevity let us refer to this rule as: defining the invention and carrying the invention beyond the art. It is significant that these two ideas are coupled together; and it is equally significant that the Supreme Court does not in any way refer to the necessity for incorporating numerical percentages in the claim. Invention means a leap into the dark; it means that the element of unpredictability is present. There can be no such thing as systematic invention and the Supreme Court knew that there could be no such thing as an inflexible rule requiring percentages to be incorporated into the claims.

Note that the Koebel claim in issue is limited to a setting for diamonds consisting of a base metal alloy, the principal ingredients of which are molybdenum, copper and cobalt, and that the product is sintered at a temperature below that which will damage the diamonds. This distinguishes not only from the non-analogous art referred to by the Examiner, and which he admits does not meet the invention (firearms, magnets, pipes, not sintered and not having as their principal ingredients the three metals referred to); and also distinguishes from the prior analogous art explained by plaintiffs' expert in his deposition (R10-13).

The Koebel claim in issue therefore does comply with this rule. It carries the invention beyond the known art in that it states that the setting is *principally* composed of three specifically named metals not heretofore used as principal ingredients in any product and not used in settings for diamonds; and the claim defines and limits the invention in that it states that the proportions of these metals are to be those that admit of the setting being sintered at a temperature below the point at which the diamonds will be injured.

The above statements in the claim completely define and limit the invention without anything further. The clause following this complete statement and reading

> "said alloy when so sintered having the property of wetting the diamonds coupled with a lack of avidity for the carbon thereof and, when thereafter cooled, of closely adhering to it."

is merely explanatory of the advantages of the invention and as such is certainly permissible as is well settled in respect to functional statements of like character

> "A limited use of terms of effect or result, which accurately define the essential qualities of a product to one skilled in the art, may in some instances be permissible and even desirable, but a characteristic essential to novelty may not be distinguished from the old art solely by its tendency

> to remedy the problems in the art met by the patent."
>
> (General Electric Co. *v.* Wabash, 304 U. S. 364)

Koebel application in suit sets out "by way of example, but not of limitation" two examples that have been successfully used:

Example No. 1

Molybdenum	26%
Cobalt	46%
Copper	27.75%
Iron	00.25%
	100%

Example No. 2

Molybdenum	40%
Cobalt	20%
Copper	40%
	100%

Two specific claims directed to these examples were allowed by the Board, these claims being as follows:

> 3. As a new article of manufacture, a setting for diamonds composed of an alloy including molybdenum, approximately twenty-six percent, copper approximately twenty-seven percent and cobalt approximately forty-six percent.
>
> 4. As a new article of manufacture, a setting for diamonds composed of an alloy including molybdenum approximately forty percent, copper approximately forty percent, and cobalt approximately twenty percent.

In accordance with Patent Office practice, unless there is a claim in the application broad enough to cover both species, division will be required and has in this case been required unless claim 7 is allowed. This means that applicant, unless he is successful in the present suit, will be compelled to take out two patents, one directed to claim 3 and the other to claim 4; and if he desires to protect other specific examples he will have to make further applications for patents to cover them. In view of the fact that the two examples given are only related by having the same three principal ingredients capable of being sintered below the critical temperature and specify widely different percentages, the question arises whether double patenting will not occur. The public is certainly entitled to know the metes and bounds of the patent but the patentee is also entitled to protection and one who has made a meritorious generic invention, as is obvious in the present case, should not be compelled to jeopardize his rights by issuance of a multiplicity of patents, none of which is of sufficient scope to protect the real invention. Obviously, what Koebel invented was not a specific formula, so far as numerical percentages are concerned, but it was the broad underlying idea that a setting for diamonds could be made out of three specifically mentioned metals that were capable of being sintered below the critical point at which the diamonds would be injured. That idea having been clearly set forth and explained in one patent, would there be any invention left in formulating other percentages of the same metals to accomplish the same result? That would seem to require only the skill of the ordinary chemist or metallurgist doing routine laboratory work.

As was said by the Court of Customs and Patent Appeals in *ex parte* Nickel (9 U.S.P.Q. 59) where the claim under consideration was limited to specific numerical percentages:

> "We are also unable to see anything inventive in the particular combination disclosed by appellant in his claims, of which claim 3 is typical. It has been suggested by the solicitor of the Patent Office that it being once known that gypsum, unslaked lime, and vitrified furnace slag might be mixed to form a cement, the proper proportions of each to be used would naturally and obviously suggest themselves to one skilled in the art."

We can see no reason for not allowing an applicant a claim broad enough to cover different species of an invention in cases where the generic invention is new as it is in the present case. Of course, had there been previous settings for diamonds composed of the three metals specified, then the applicant would be forced to recite specific percentages, always assuming however that such specific percentages would constitute an improvement over other and previously known percentages; but certainly, if the underlying idea of combining the three metals and sintering them below the critical temperature had been disclosed in a patent, an applicant would have an unusual burden in proving that a different set of percentages of the same materials produced an unexpected and unobvious result; and that burden would rest just as heavily on Koebel as on anybody else should he attempt to obtain a series of patents on specific numerical percentages. There is nothing in the Koebel application to show that either example therein specified is better than the other.

It is believed therefore that it cannot be justly said that claim 7 of the Koebel patent is broader than the invention nor can it be said that it blankets the art and prevents other inventors from combining other materials to produce a better result or even the same result.

In the recent decision of General Electric *v.* Wabash, the Supreme Court announced no new doctrine but simply followed the Holland *v.* Perkins and other earlier cases. The patent there dealt with the grain structure of the filament of an electric lamp. Claim 25 is a typical claim, and is as follows:

> A filament for electric incandescent lamps or other devices, composed substantially of tungsten and made up mainly of a number of comparatively large grains of such size and contour as to prevent substantial sagging and offsetting during a normal or commercially useful life for such a lamp or other device.

"Large grains of such size and contour" etc. was, of course, entirely too vague. Even the description did not disclose the size or the contour, and the claims moreover did not distinguish from the prior art.

Said the Court:

> "Pacz did not adequately set out 'what he claims to be new.' The tungsten filament 'made up mainly of a number of comparatively large grains,' * * * serves aptly to describe the product of earlier manufacture, with its large regular grains subject to offsetting."

The Supreme Court was also careful, lest some of the language of the decision be misunderstood, to insert numerous qualifications and exceptions in said decision. For instance:

> "A limited use of terms of effect or result, which accurately define the essential qualities of a product to one skilled in the art, may in some instances be permissible and even desirable, but a characteristic essential to novelty may not be distinguished from the old art solely by its tendency to remedy the problems in the art met by the patent."

What has been said above in reference to Holland *v.* Perkins applies equally here; the Supreme Court did not lay down a rigid form of specific test, but used only general language to show that a patentee must point out the invention so as to distinguish over the prior art and must inform the public of the boundaries of the patent. The Koebel claim clearly distinguishes over the art by reciting the three principal ingredients of the substance and its sinterability, because there is admittedly nothing like it in the art, and, by the same token, it lays down an infallible test whereby the public can readily inform itself of the scope of the patent.

That the foregoing interpretation of General Electric *v.* Wabash is the correct one is shown by the comments in cases decided since that decision was rendered. Thus in Schick Dry Shaver Inc. *v.* Motoshaver, Inc. (decided November 12, 1938 and at this writing reported only in 39 U.S.P.Q. 361), the Court said:

> "We think the recent decision of the Supreme Court in General Electric Co. *v.* Wabash Co., 304 U.S. 364 [37 U.S.P.Q. 466], which considered the recondite granular composition of filaments for electric incandescent lamps, is not comparable to the art of electrically driven dry shaving machines. In the former the field is limited and therefore the variant from earlier inventions must be specifically defined in the claims in order to comply with statutory requirements. 35 U.S.C.A. 33."

Likewise in H. H. Robertson Co. *v.* Klauer Mfg. Co. (98 F(2) 150) the Court said:

> "The argument is that the patent does not define 'substantial' or 'substantial space' so that such space could be ascertained therefrom by one skilled in the art. While the statute (35 U.S.C.A. § 33) requires 'such full, clear, concise, and exact terms as to enable any person skilled in the art * * * to make, construct, compound, and use the same' yet 'A limited use of terms of effect or result, which accurately define the essential qualities of a product to one skilled in the art, may in some instances be permissible and even desirable.' General Elec. Co. *v.* Wabash Appliance Corp., 58 S.Ct. 899, 903, 82 L.Ed. ——, May 16, 1938. Here the space is hardly capable of mathematical determination and definition since that space is largely dependent upon the relativity of the eduction pipe, the storm band and the cap and such relativity must be applied to ventilators of varying sizes."

CONCLUSION

The record shows that Koebel made a generic invention of a primary character in the limited field of diamond setting; that the three specified materials molybdenum, copper and cobalt have not been used as the principal ingredients in any composition even in non-analogous arts; that a setting for diamonds sinterable at the point below the critical temperature where the diamonds are injured is new in the art; that the specification teaches the public how to make the setting by two specific methods; that the relative numerical percentages of the three principal ingredients are not of the essence of the invention, so long as the setting is sinterable below the critical point, as shown by the wide diversity of percentages in the two examples given "by way of illustration, but not of limitation" in the specification; that the invention is defined and limited in the claim by the inclusion of specifically named ingredients sinterable below the temperature point where the diamonds are adversely affected; that the proportions are thereby sufficiently given and an infallible standard is thereby set up whereby the question of infringement can be determined without undue experimentation; and that the claim does not blanket the art but leaves other inventors free to combine other materials to obtain better or the same results.

The decision of the Court below should therefore be reversed and the grant of the patent authorized.

Respectfully submitted,

Axel V. Beeken,
Attorney for Plaintiffs-Appellants.

UNITED STATES
COURT OF APPEALS FOR THE
DISTRICT OF COLUMBIA

FILED DEC 22 1938

Joseph W. Stewart

CLERK

No. 7225

In the United States Court of Appeals for the District of Columbia

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Charles J. Koebel and Koebel Diamond Tool Co., appellant

v.

Conway P. Coe, Commissioner of Patents,
appellee

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA

BRIEF FOR THE COMMISSIONER OF PATENTS

R. F. WHITEHEAD,
Solicitor, U. S. Patent Office,
Attorney for Appellee.

In the United States Court of Appeals for the District of Columbia

October Term, 1938

No. 7225

Charles J. Koebel and Koebel Diamond Tool Co., appellants

vs.

Conway P. Coe, Commissioner of Patents, appellee

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA

BRIEF FOR THE COMMISSIONER OF PATENTS

This is an appeal in the usual case brought under the provisions of Section 4915 R. S. (U. S. C., title 35, sec. 63).

The application for patent involved is that filed by Charles J. Koebel on January 12, 1932, Serial No. 407,829, for Settings for Diamonds, and the claim in question is claim 7 of that application, which reads as follows:

> 7. As a new article of manufacture, a setting for diamonds consisting of a base metal alloy the principal ingredients of which are

> molybdenum, copper, and cobalt so proportioned as to be capable of being sintered at a temperature below that of the critical point at which the desirable qualities of the diamond are adversely affected, said alloy when so sintered having the property of wetting the diamonds coupled with a lack of avidity for the carbon thereof and, when thereafter cooled, of closely adhering to it.

The application of Koebel is set out in full in the record, beginning with page 22. It appears that it was filed as a division of an earlier application No. 462,485, which matured into Patent No. 1,848,182.

The application in suit states that the invention relates generally to alloys and has more particularly reference to alloys used for the purpose of setting diamonds, carbonadoes, or the like. It states further the manner in which diamonds have been used in industrial arts, for example, as dressing tools for grinding wheels, or core bits for rock drilling, and refers to the difficulties which have been found in mounting the diamonds, and then states:

> It is the main object and feature of this invention to produce a base metal alloy which possesses such characteristics that when subjected to heat at a point below said critical point said alloy exhibits the property of wetting the diamond coupled with a lack of avidity for the carbon of the diamond, and when thereafter cooled of closely adhering to it.

It is further stated that the critical point mentioned in the matter above quoted is in the neighborhood of 1,380 degrees centigrade and that excellent results have been obtained by using a temperature between 1,245 and 1,260 degrees centigrade.

There is then given two examples of the composition which has been employed and it is stated that the materials of which the alloy is formed are reduced to powder form and thoroughly mixed, a slight amount of paraffine being added, before the diamond is imbedded therein. There is given the reasons for employing the different metals and the process by which the diamonds are imbedded is described.

The two examples are as follows:

Example No. 1

Molybdenum	26%
Cobalt	46%
Copper	27.75%
Iron	00.25%
	100%

Example No. 2

Molybdenum	40%
Cobalt	29%
Copper	40%
	100%

It is to be noted that no range of the elements of the alloy is stated, nor is there anything given in the specification to justify a statement that any proportion of the elements may be employed.

The examiner allowed two claims, one of which is to the first of the compositions and the other to the second, subject to the requirement of division if a generic claim is not allowed.

It will be noted that the claim in suit merely states that the principal ingredients for the alloy are molybdenum, copper, and cobalt, but no suggestion is made as to what the ingredients other than the principal ones are, nor is there anything in the specification to indicate that any alloy was ever used in which the three named ingredients were not the only ingredients, except Example No. 1, which includes 0.25% of iron. The only limitation contained in claim 7 to determine in what proportions the ingredients of the alloy should be used is the functional statement that the ingredients are so proportioned "as to be capable of being sintered at a temperature below that of the critical point at which the desirable qualities of the diamond are adversely affected," and the statement that the alloy when so sintered has "the property of wetting the diamonds coupled with a lack of avidity for the carbon thereof and, when thereafter cooled, of closely adhering to it."

The examiner cited certain references, which it was stated did not anticipate the claim but were merely cited to show the use of the particular ingredients of appellant's alloy. He rejected the claim, however, as broader than applicant's invention.

The District Court, in its Memorandum Opinion (R. p. 80) said:

> I agree with the opinion of the Board of Appeals of the Patent Office in holding that

> the plaintiff's claim No. 7 does not specify the proportions of the components of the alloy in such a definite way that it can be made without resorting to experiment and therefore fails to clearly define the invention, and also that the claim is broader than the invention discloses.

In the Conclusions of Law the court stated (1) that claim 7 does not clearly define the invention, and (2) that it is broader than the invention disclosed in the application.

It is submitted that the claim falls clearly within the ruling of the recent decision of the Supreme Court of the United States in the case of *General Electric Co.* v. *Wabash Appliance Corporation et al.*, 304 U. S. 364.

That case involved a patent to Pacz, No. 1,410,499, owned by the General Electric Company, which patent related to a tungsten filament for incandescent lamps. The Pacz filament was stated to be free from the faults of earlier tungsten filaments due to "offsetting" and "sagging," and one of the claims in suit, stated by the court to be typical, was claim 25, which reads as follows:

> 25. A filament for electric incandescent lamps or other devices, composed substantially of tungsten and made up mainly of a number of comparatively large grains of such size and contour as to prevent substantial sagging and offsetting during a normal or commercially useful life for such a lamp or other device.

The court, in its decision, after stating that it might be assumed that Pacz had sufficiently informed those skilled in the art how to make and use his filament, referred to the statutory requirements with reference to specification and claims, and said:

> * * * Patents, whether basic or for improvements, must comply accurately and precisely with the statutory requirements as to claims of invention or discovery. The limits of a patent must be known for the protection of the patentee, the encouragement of the inventive genius of others, and the assurance that the subject of the patent will be dedicated ultimately to the public. The statute seeks to guard against unreasonable advantages to the patentee and disadvantages to others arising from uncertainty as to their rights.

And then further said:

> * * * Patentees may reasonably anticipate that claimed inventions, improvements, and discoveries, turning on points so refined as the granular structure of products, require precise descriptions of the new characteristic for which protection is sought. In a limited field the variant must be clearly defined.

The court then said:

> Pacz did not adequately set out "what he claims to be new." * * * The failure of the patentee to make claim to a distinct improvement is made clear by com-

> parison of the language of the claims under consideration with descriptions of offset difficulties recognized by other inventors.
>
> The claim further states that the grains must be "of such size and contour as to prevent substantial sagging and offsetting" during a commercially useful life for the lamp. The clause is inadequate as a description of the structural characteristics of the grains.
>
> * * * * *
>
> The claim uses indeterminate adjectives which describe the function of the grains to the exclusion of any structural definition, and thus falls within the condemnation of the doctrine that a patentee may not broaden his product claims by describing the product in terms of function. Claim 25 vividly illustrates the vice of a description in terms of function. "As a description of the invention it is insufficient and if allowed would extend the monopoly beyond the invention."

And then, after stating that the Court of Appeals of the Ninth Circuit, in its decision on this patent, had relied on the fact that "the description in the claims is not 'wholly' functional," said:

> But the vice of a functional claim exists not only when a claim is "wholly" functional, if that is ever true, but also when the inventor is painstaking when he recites what has already been seen, and then uses conveniently functional language at the exact point of novelty.

The court then stated that in some instances a limited use of terms of effect or result, which accurately define the essential qualities of the product, may be permissible but that "a characteristic essential to novelty may not be distinguished from the old art solely by its tendency to remedy the problems in the art met by the patent."

It is submitted that the claim in suit falls clearly within the ruling of that decision.

Appellants, in their brief, refer to certain patents which, it is stated, contain claims that are of the same type as claim 7 of the Koebel application.

It is not necessary to consider whether the conclusion as to the similarity of the claims is accurate or not. In the first place, the allowance of a claim by the Patent Office does not, in and of itself, demonstrate that the claim of some other application is allowable. Furthermore, if the claims were exactly like the claim here in suit, it would not justify the Patent Office in allowing the claim in suit if it is of the character condemned in the decision of the Supreme Court of the United States.

It is submitted that the statement of the District Court in the Memorandum Opinion and the Conclusions of Law made by the court were correct, and it is further submitted that the decree of the court should be affirmed.

R. F. WHITEHEAD,
Solicitor, U. S. Patent Office,
Attorney for Appellee.

U. S. GOVERNMENT PRINTING OFFICE: 1938

UNITED STATES
COURT OF APPEALS FOR THE
DISTRICT OF COLUMBIA

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Plaintiffs-Appellants,

v.

CONWAY P. COE, COMMISSIONER OF PATENTS,
Defendant-Appellee.

Appeal from the Decision of the District Court of the United States for the District of Columbia in Suit Under R. S. 4915.

REPLY BRIEF ON BEHALF OF PLAINTIFFS-APPELLANTS.

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Appeal from the Decision of the District Court of the United States for the District of Columbia in Suit Under R. S. 4915.

REPLY BRIEF ON BEHALF OF PLAINTIFFS-APPELLANTS.

The solicitor of the Patent Office in his argument before the court below relied upon the case of *Holland* v. *Perkins* (72 L. ed. 868). In the interval between the trial of the case and the decision of the court, the case of *General Electric* v. *Wabash* (82 L. ed. 912) was decided and a copy of the opinion of the Supreme Court in that case was immediately forwarded to Justice Bailey.

The solicitor of the Patent Office in his brief before this tribunal appears to rely exclusively on the *General Electric Company* v. *Wabash,* the implication being that the ruling in that case lay down a new doctrine that disposes of the case at bar; and he contents himself with quoting certain language from that decision without showing how that language is applicable in the present instance. It is submitted, however, that we are not dealing with words but with realities and that a consideration of the words of a decision *as words* without a consideration of the facts to which the words apply in the case in which the words were used is not fruitful of an understanding of the decision.

In the first place, the court in *General Electric* v. *Wabash* did not announce any new doctrine, as the footnotes amply show, and the holding in regard to functionality is distinctly based upon the holding in *Holland Furniture Co.* v. *Perkins* as shown by footnote 8 of the decision. A careful reading of the case of the *General Electric Co.* v. *Wabash* shows that the object of the invention was to prevent "offsetting" and "sagging" of tungsten filaments. Pacz, the inventor, attempted to overcome this defect by having the tungsten grains of a particular kind as to size and contour. The court held that Pacz did not adequately set out what he claims to be new because the language used by him, "serves aptly to describe the product of earlier manufacture, with its large regular grains * * *"; and the court further said, "the failure of the patentee to make claim to a distinct improvement is made clear by comparison of the language of the claims under consideration with descriptions of offset difficulties recognized by other inventors.'' The inventor did not even adequately describe his invention in his specification and on this point the court said, ''the specification of the Pacz patent does not attempt in any way to describe the filament except by mention of its coarse grain quality.'' From the foregoing, it is evident that Pacz did not disclose the invention not only in the claims but not even in the specification; that he failed to differentiate from the prior art; and that at the precise point where novelty was to be found, namely in the size and contour of the grain structure, the claims are purely functional.

Now if we turn to the case at bar, we find that the applicant has produced a new setting for diamonds which setting consists of an alloy composed *principally* of molybdenum, cobalt and copper which alloy can be sintered below the critical point at which the desirable qualities of the diamonds are adversely affected. There is nothing in the specification to indicate that numerical percentages of the three elements enumerated are of importance. But, quite to the contrary, by setting out two examples in which the percentages are widely different applicant makes clear that the percentages are not important so long as the alloy is composed principally of the three elements molybdenum, cobalt and copper. If the numerical percentages were important, it would obviously not be possible to have 26 per cent of molybdenum in one instance and 40 per cent in the other; or 46 per cent of cobalt in one instance and 20 per cent in the other; or 27.75 per cent of copper in one instance and 40 per cent in the other. If the prior art had shown a setting for diamonds composed, in whole or in part, of the three elements specified, then there would be good ground for saying that in order to distinguish over the prior art and to express the inventive idea, it would be necessary to specifically mention the numerical percentages and applicant would then be under a further duty to show that such specific percentages constituted the nub of the invention and produced an unexpected result. But such is not the case here. It is not questioned that applicant has obtained a new and unexpected result and the numerical percentages are in the specification to disclose to the public how the product can be made and not for the purpose of distinguishing over the prior art or of completely expressing the inventive idea.

In our main brief we have pointed out (on pp. 21 and 22) how the courts have construed the case of *General Electric Co.* v. *Wabash* and also on (pp. 13-14) how this court has allowed claims without numerical percentages where the element of novelty does not reside in specific numerical percentages; and we have further pointed out (on p. 19 of our main brief), the general attitude of the courts with regard to proportions which are usually a matter of the skill of the chemist or metallurgist and not a question of invention. This tribunal, in common with other courts, has always considered the question of novelty of the invention in passing upon the question of whether or not a claim complies with the requirements of R. S. 4888. This is shown in *Raytheon Mfg. Co. of Newton, Mass.* v. *Coe* (96 F. (2) 527) which was decided on March 11, 1938 in which Justice Robb said:

> "While it is incumbent upon an applicant plainly to state the scope of his invention or discovery in accordance with R. S. 4888 as amended

> (35 USCA Section 33) requiring that he 'shall particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery' [citing cases] it should be kept in mind that claims are interpreted with reference to the specification and drawings. In the present case we think the applicant has so drawn claims 40 and 41 as to avoid the charge that they are improperly functional."

As a matter of fact, this court has had occasion since the decision in the case of *General Electric Co.* v. *Wabash* to favorably pass upon claims that could with equal justice, be criticized if the argument of the solicitor of the Patent Office is to be sustained. In *Electrons Inc. et al.* v. *Coe* (38 U. S. P. Q. 370) part of claim 55, which claim is found on page 373, states "the said gaseous discharge being adapted to raise the metal vapor density throughout the path sufficiently to make the metal vapor the main source of emitted rays." Claims 49 and 54 contain similar expressions.

Respectfully submitted,

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